AD-A034 242 MCDERMOTT (J RAY) CO INC NEW ORLEANS LA F/G 13/10

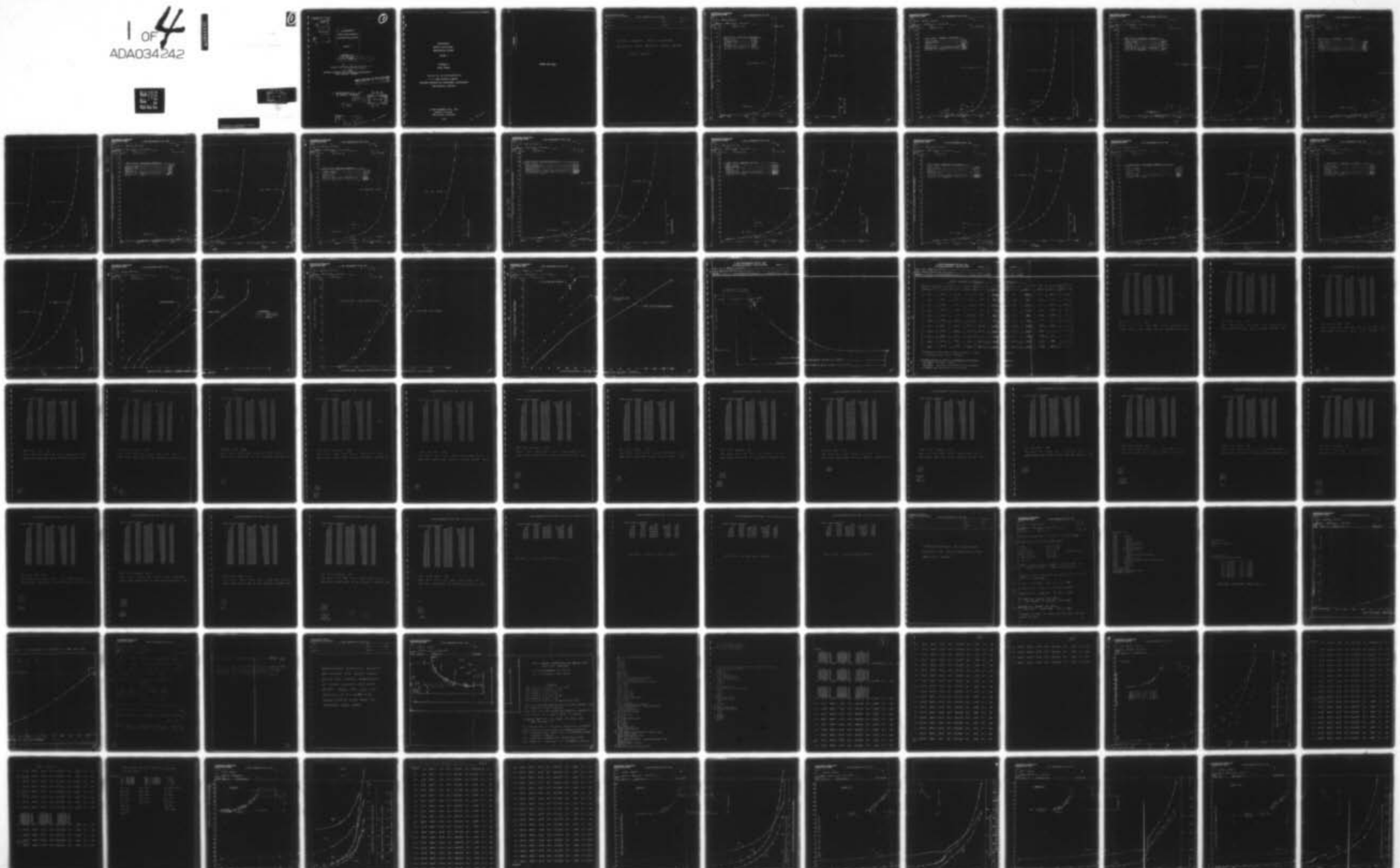
ENGINEERING DESIGN CALCULATIONS MONO-MOORING SYSTEM. VOLUME 1. --ETC(U)

1966 DA-44-009-AMC-841(T)

UNCLASSIFIED NL

1 OF 4

ADA034242



4

4242

ACCESSION for
NTIS White Section ☑
DDC Buff Section ☐
UNANNOUNCED ☐
JUSTIFICATION
DISTRIBUTION/AVAILABILITY CODES
Dist. AVAIL. and/or SPECIAL
A

1

6 ENGINEERING

DESIGN CALCULATIONS

MONO-MOORING SYSTEM,

VOLUME 1.

APPENDIX A,
TO
9 FINAL REPORT, on Phase 1,

15 Contract No. DA-44-009-AMC-841(T) new

U. S. ARMY
ENGINEER RESEARCH AND DEVELOPMENT LABORATORIES
FORT BELVOIR, VIRGINIA

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J. RAY McDERMOTT & CO., INC.
NEW ORLEANS, LOUISIANA

12 300p.

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ENGINEERING

DESIGN CALCULATIONS

MONO-MOORING SYSTEM

VOLUME 1

APPENDIX A
to
FINAL REPORT

Contract No. DA-44-009-AMC-841(T)

U. S. ARMY MATERIEL COMMAND

ENGINEER RESEARCH AND DEVELOPMENT LABORATORIES

FORT BELVOIR, VIRGINIA

J. RAY McDERMOTT & CO., INC.
Saratoga Building
New Orleans, Louisiana

1966

DC 77. 8 17

SECTION I

ANCHOR AND CHAIN

COMPUTATION SHEET
ENGINEERING DEPARTMENT
McD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

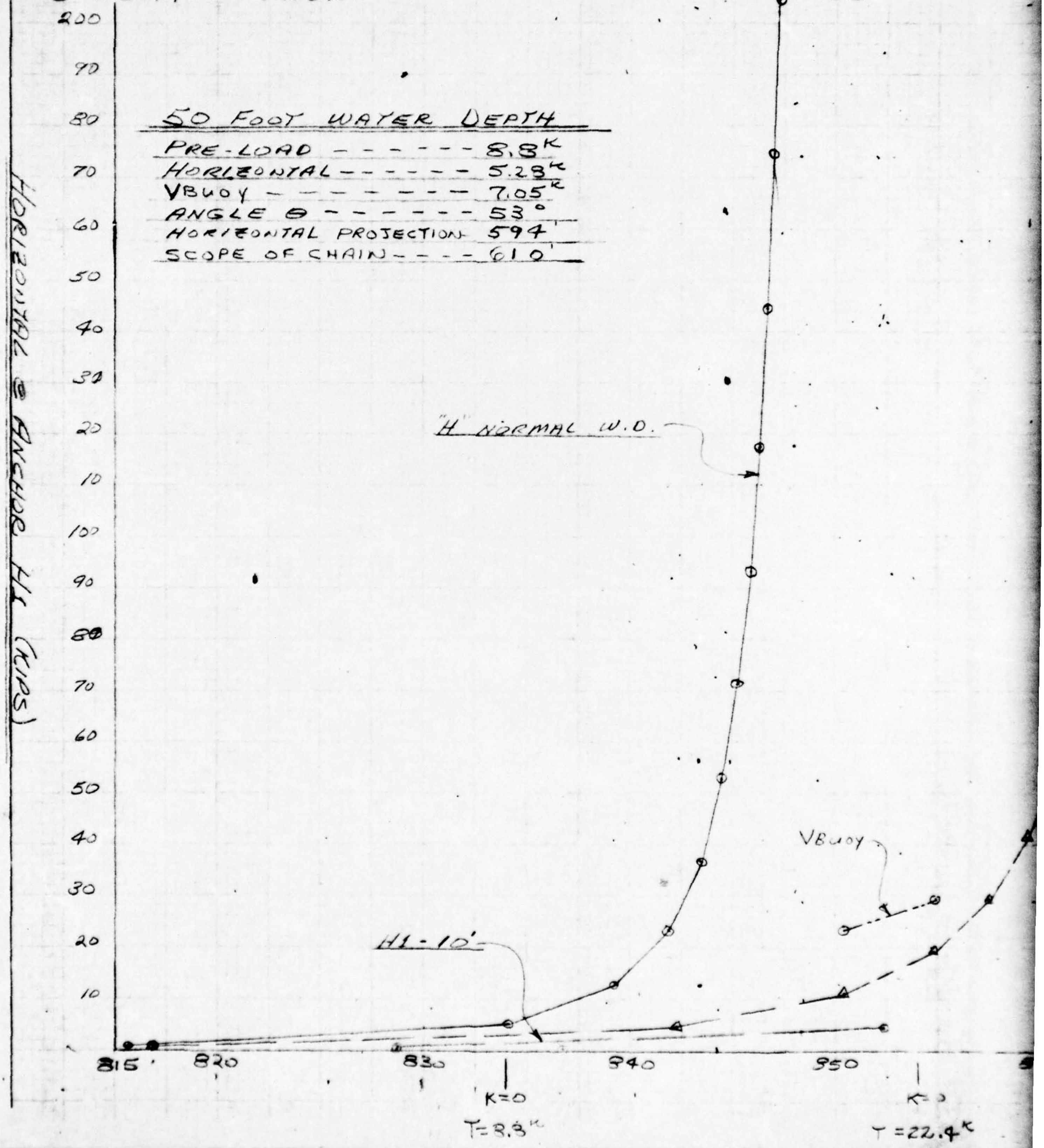
FINAL CURVES AND COMPUTER RESULTS FOR VARIOUS WATER DEPTHS

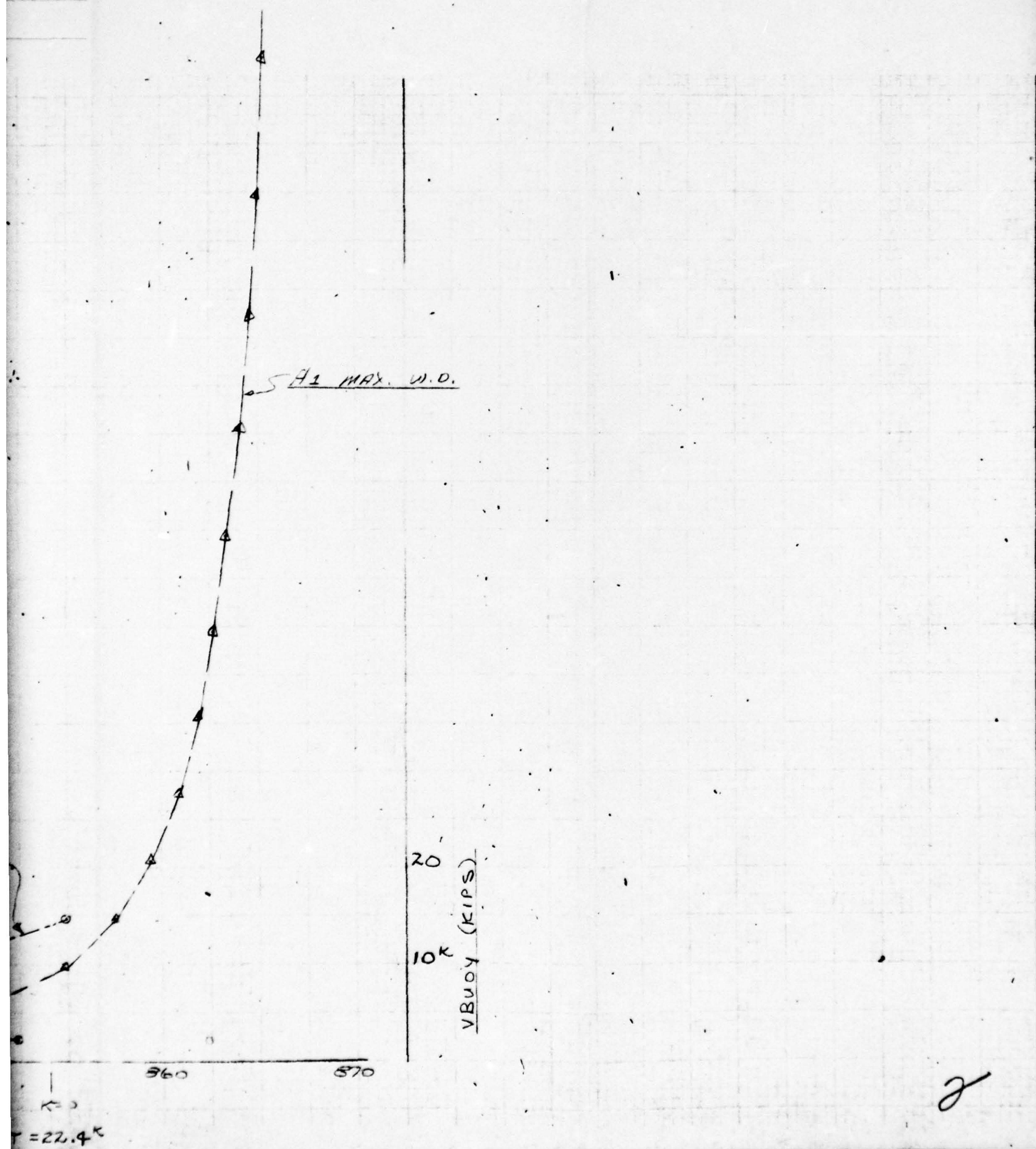
(50' - 150')

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MED 5036

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO.
U.S. ARMY/ERDL			1
SUBJECT			
MONO-MOORING SYSTEM			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-14-65





A1 MAX. W.D.
20'
10K
VBUOY (KIPS)
860
870
T = 22.4K

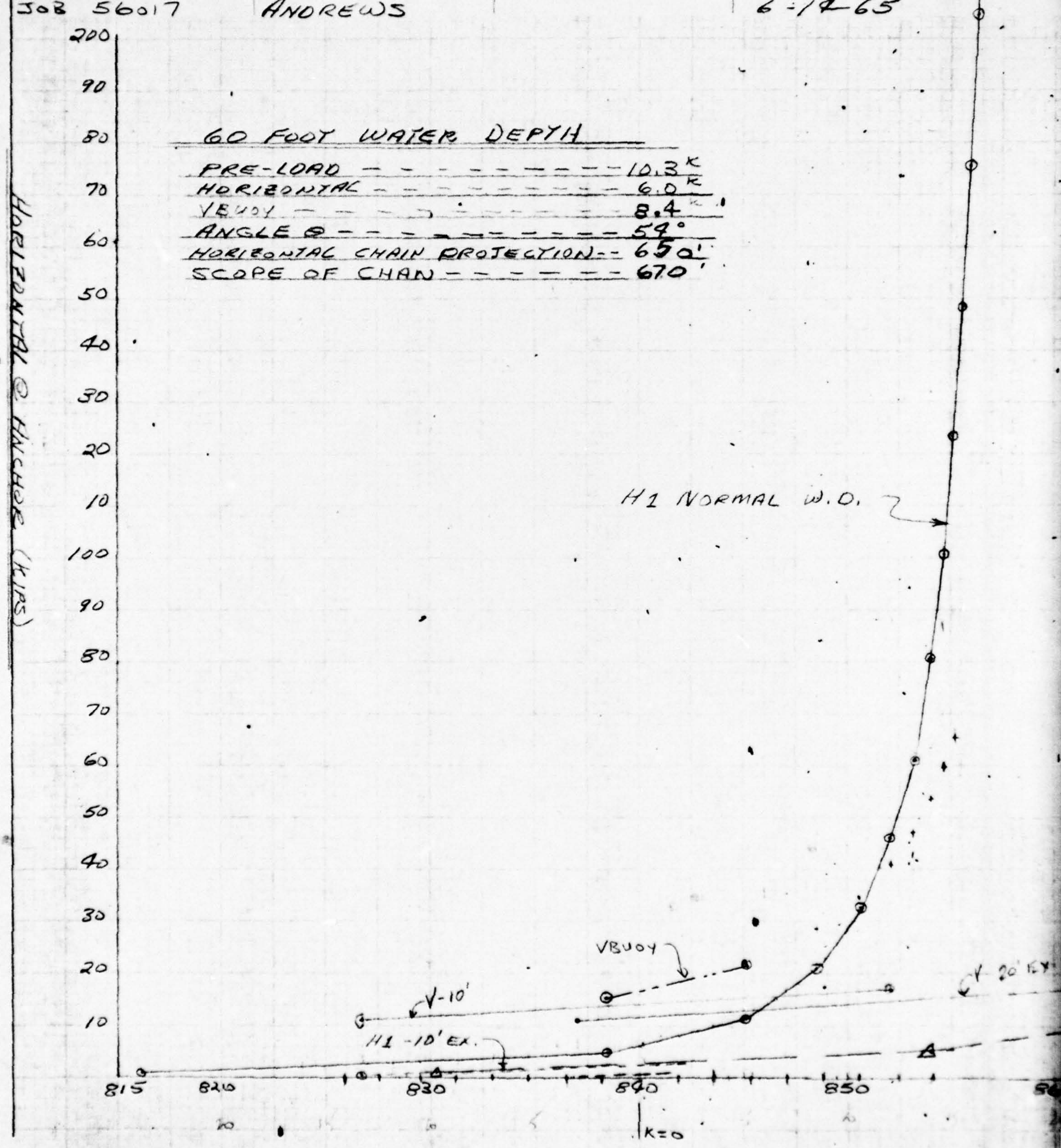
ENGINEERING DEPARTMENT
COMPUTATION SHEET
ECD 3036

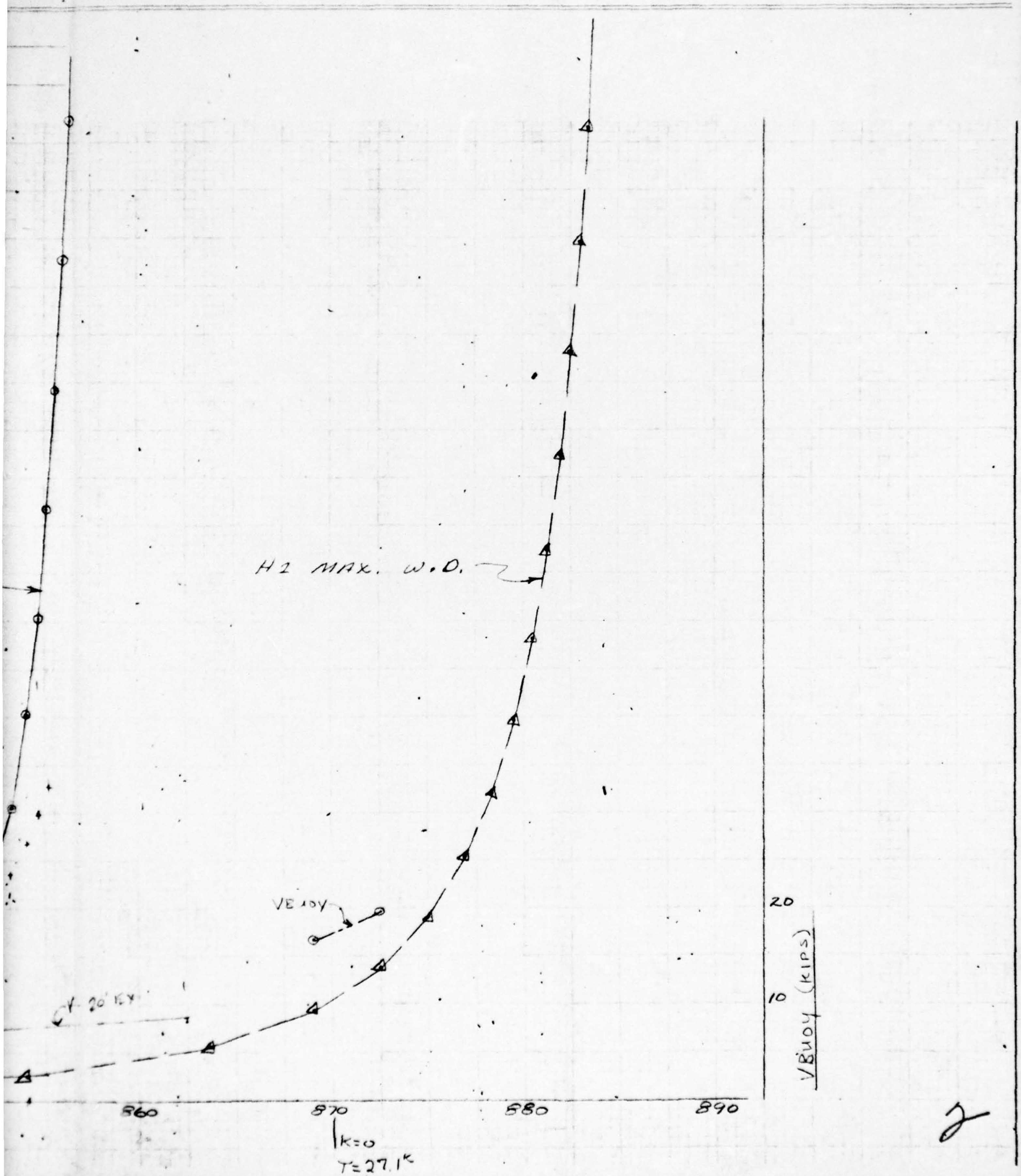
J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / ERDL
SHEET NO: 2

SUBJECT: MONO-MOORING SYSTEM

NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 6-17-65



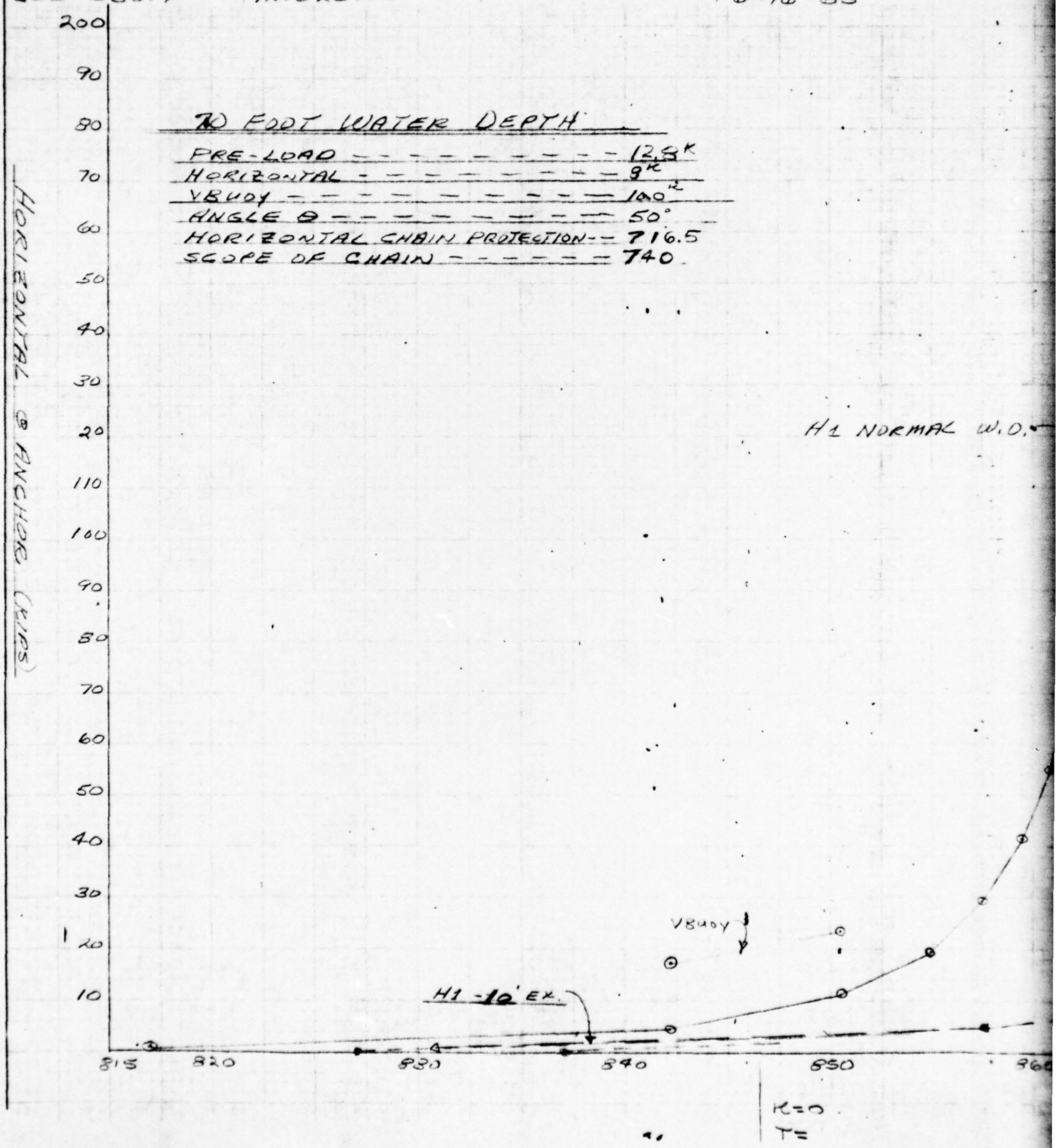

H1 MAX. W.D.
VE 10Y
V- 20' EX
860
870
880
890
k=0
T=27.1k
20
10
VBUOY (KIPS)

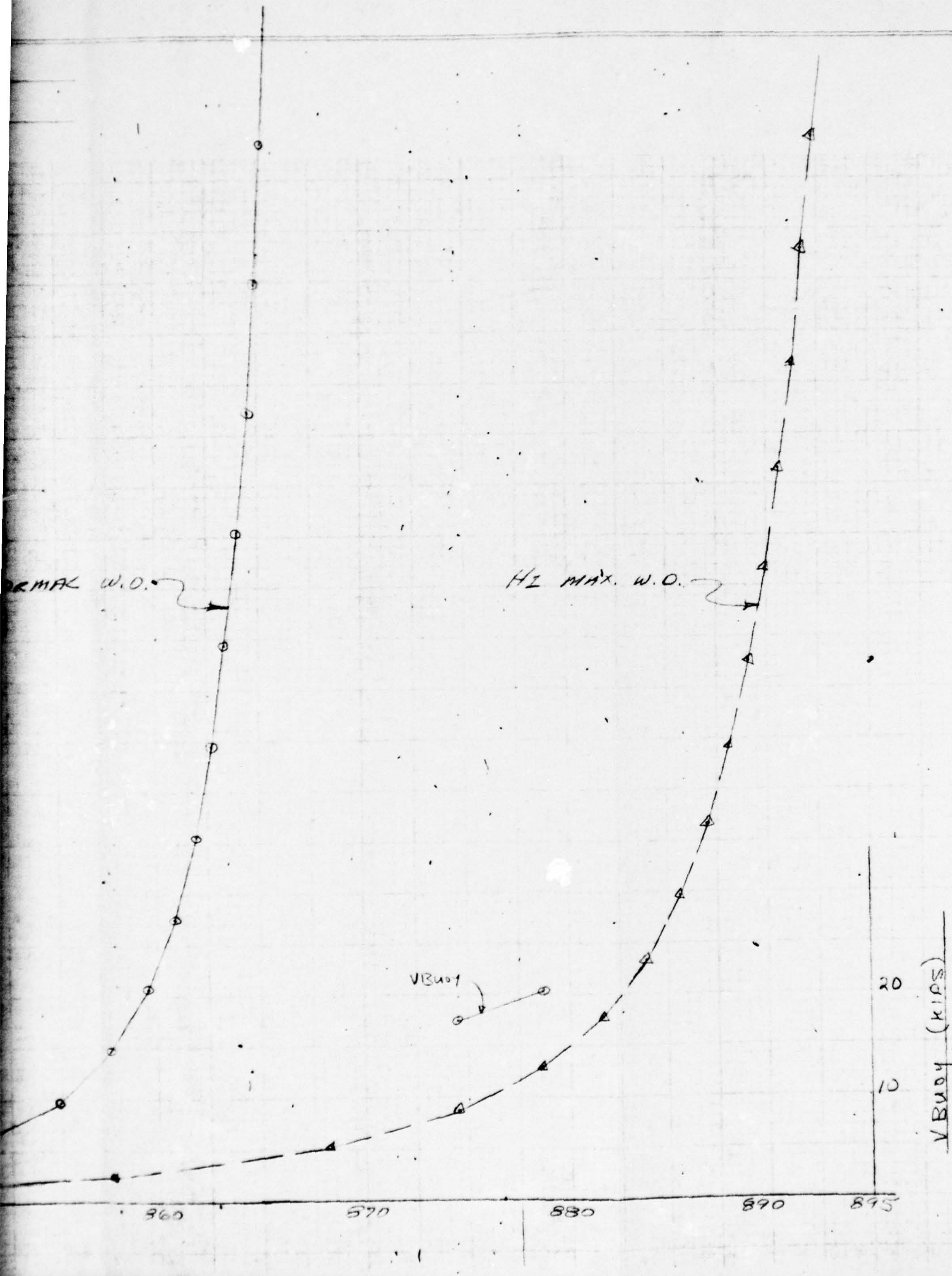
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY/ERDL	3

SUBJECT			
MONO-MOORING SYSTEM			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-16-65



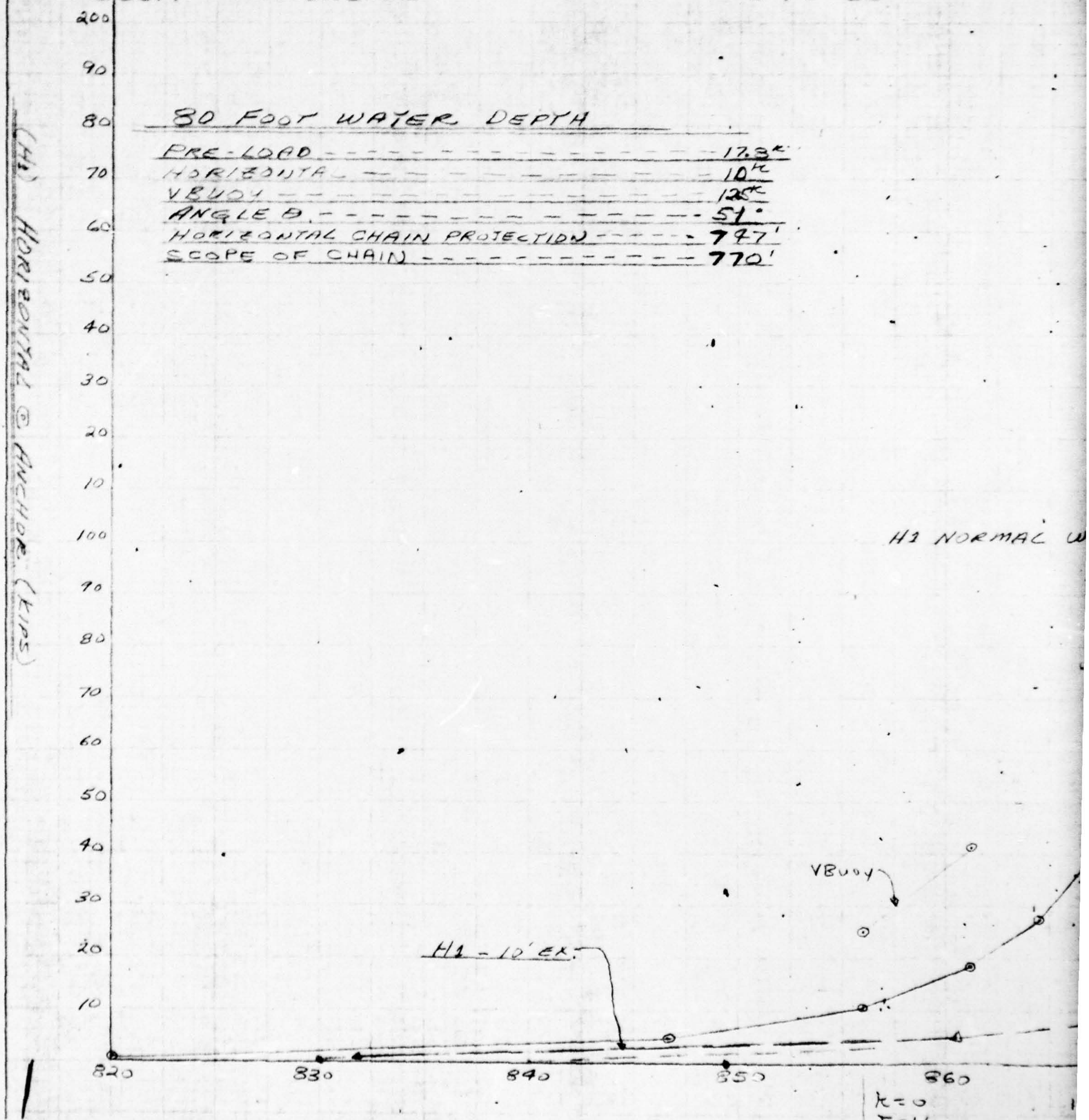


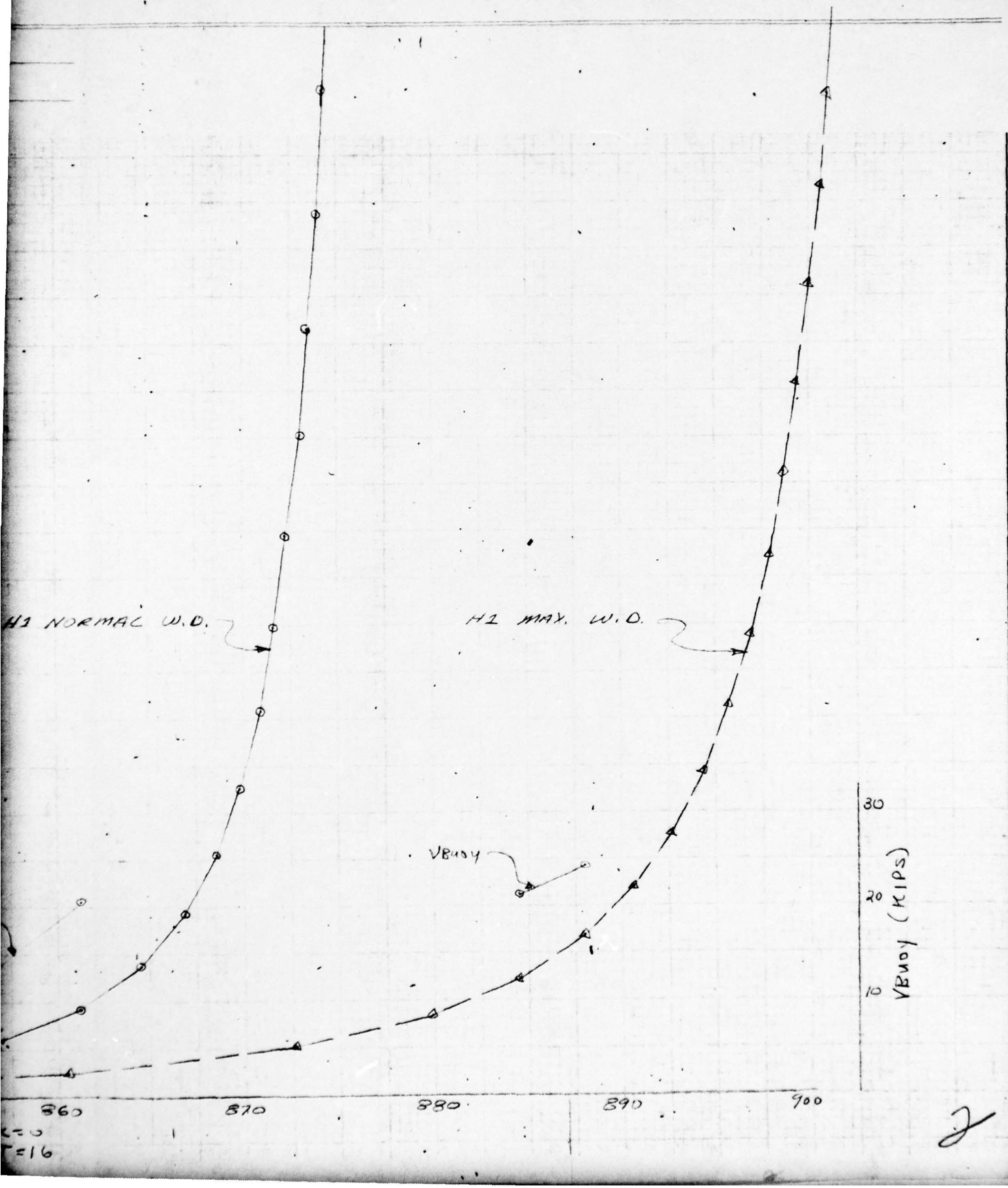
7

ENGINEERING DEPARTMENT
COMPUTATION SHEET
7SCD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
U.S. ARMY / EROL			4
SUBJECT			
MONO-MOORING SYSTEM			
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-16-65





H1 NORMAL W.D.
H1 MAX. W.D.
VBuoy
VBuoy (KIPS)
10
20
30
860
870
880
890
900

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

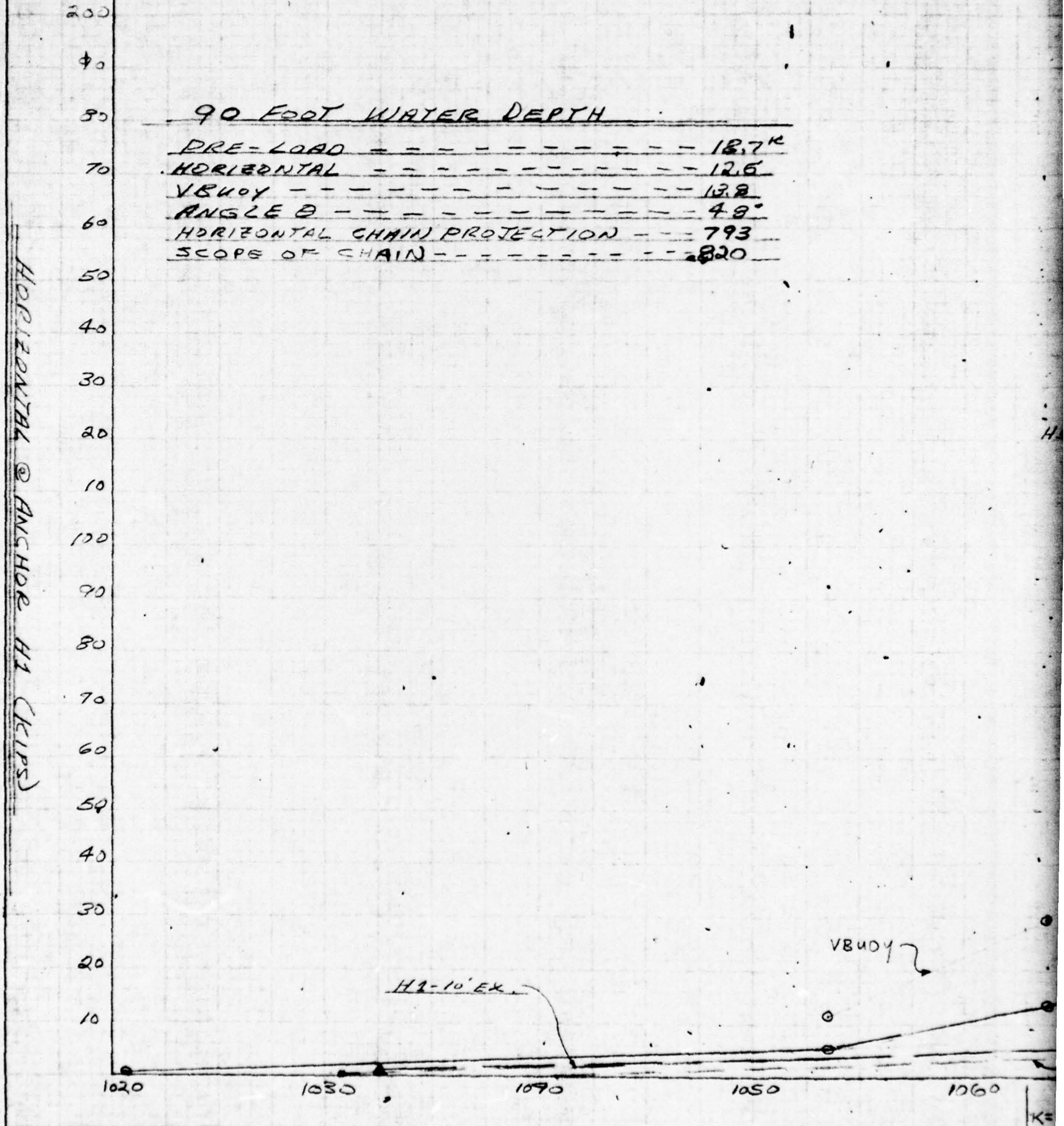
COMPANY	SHEET NO.
U. S. ARMY / ERDL	5

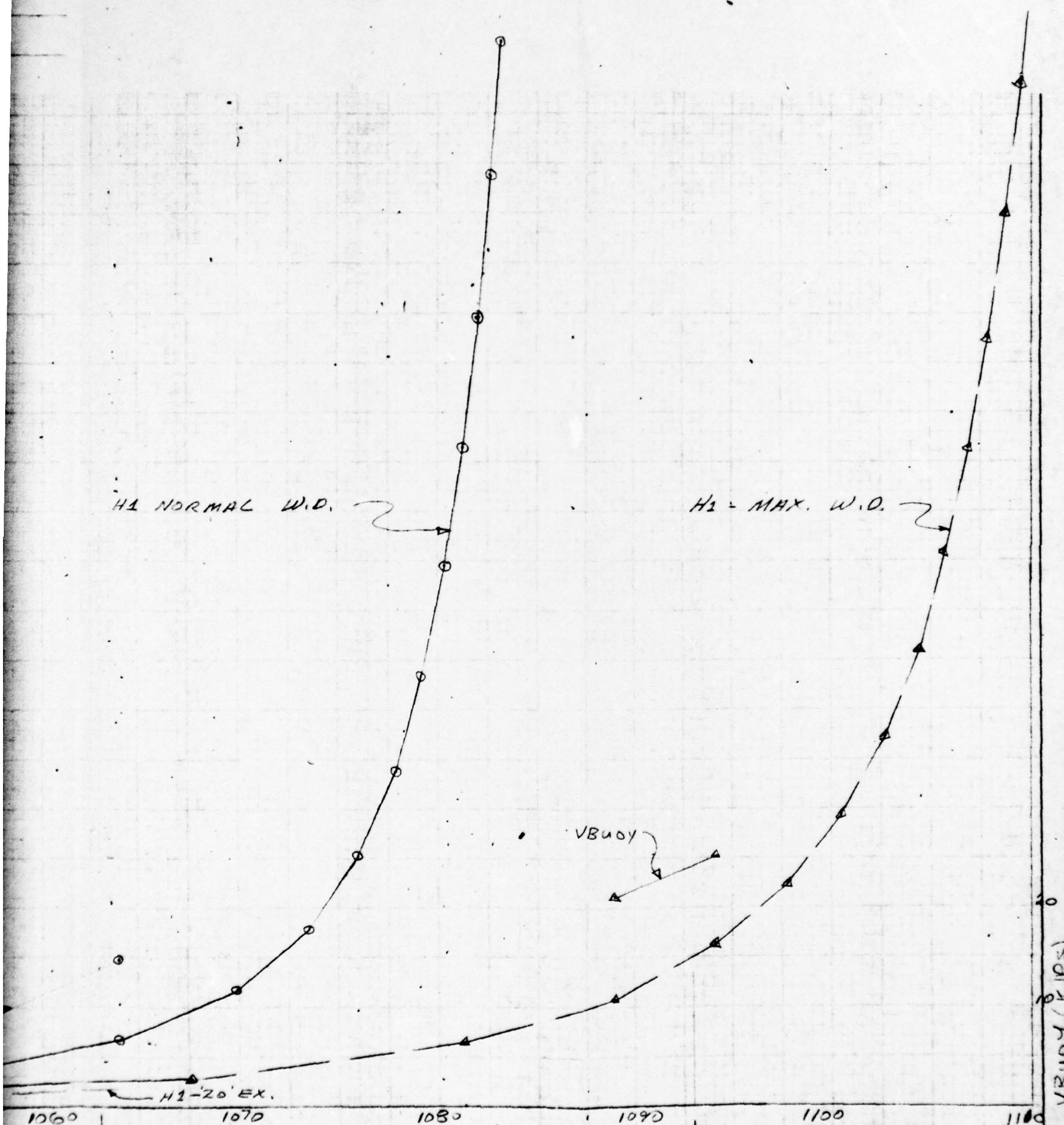
SUBJECT: MONO - MOORING SYSTEM

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-16-65

90 FOOT WATER DEPTH

PRE-LOAD	18.7^K
HORIZONTAL	12.6
VBUOY	13.8
ANGLE θ	48°
HORIZONTAL CHAIN PROJECTION	793
SCOPE OF CHAIN	820





H1 NORMAL W.D.
H1 - MAX. W.O.
VBUOY
H1-'20' EX.
1060
1070
1080
1090
1100
1110
K=0
T=18.6K
K=0
38.4K
20
10
VBUOY (KIPS)
2

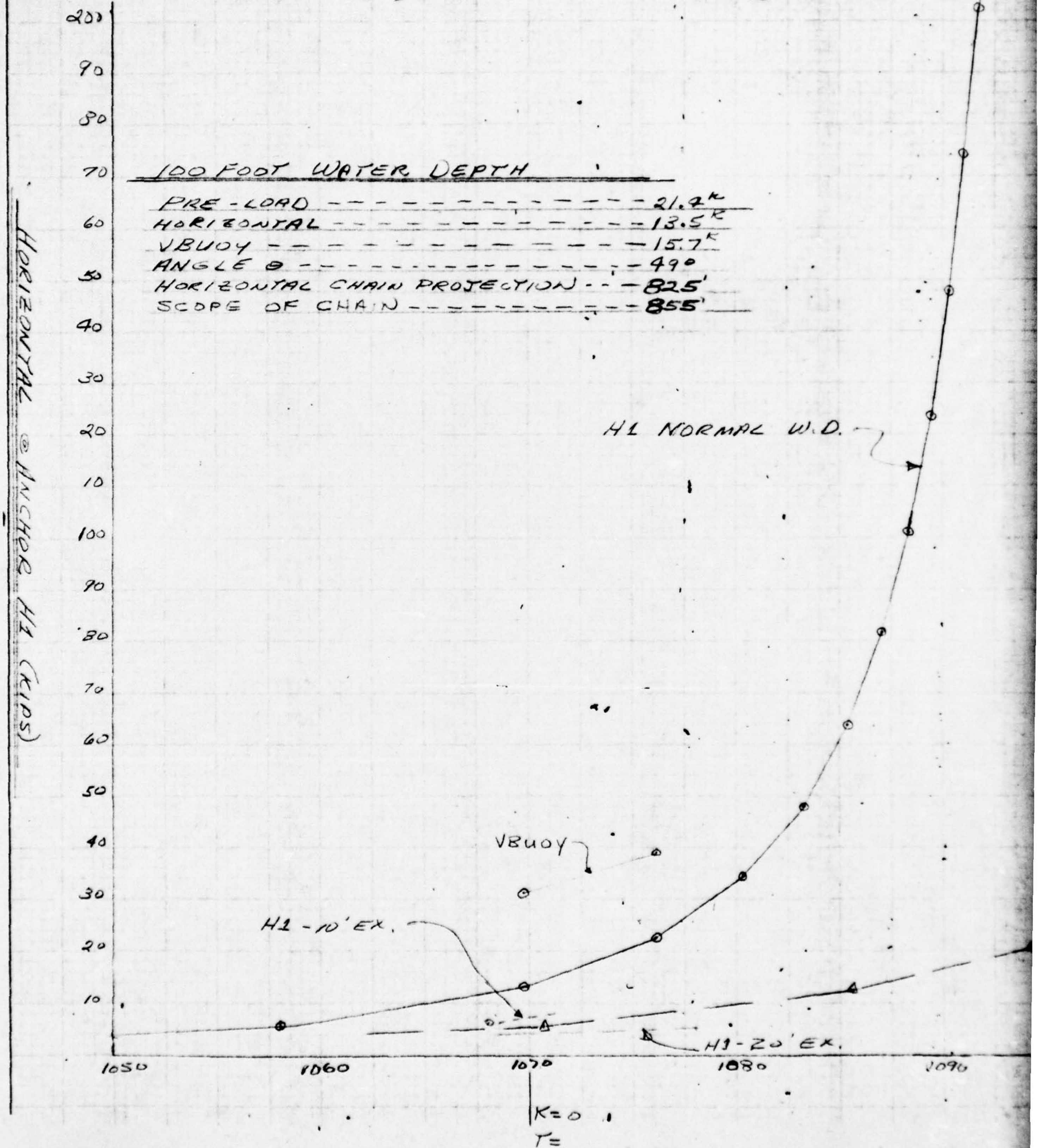
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

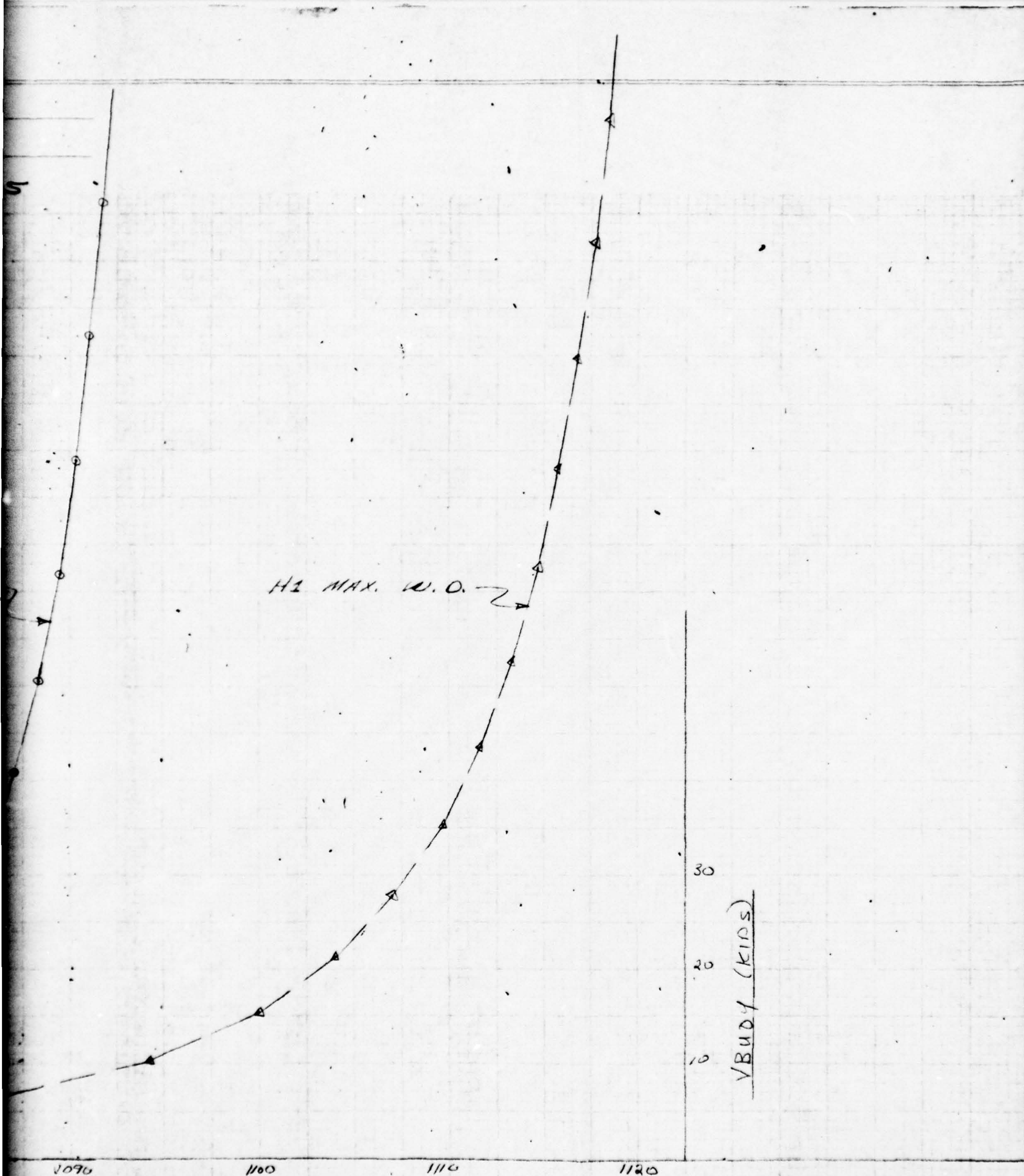
J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO.
U.S. ARMY / ECOL	6

SUBJECT: MONO-MOORING SYSTEM

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-21-65





K = 0

T = 40.5^{k}

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: U. S. ARMY/EROL

SHEET NO: 7

SUBJECT: MONO-MOORING SYSTEM

DRAWING NUMBER: JOB 56017

COMPUTER: ANDREWS

CHECKED BY:

DATE: 6-21-65

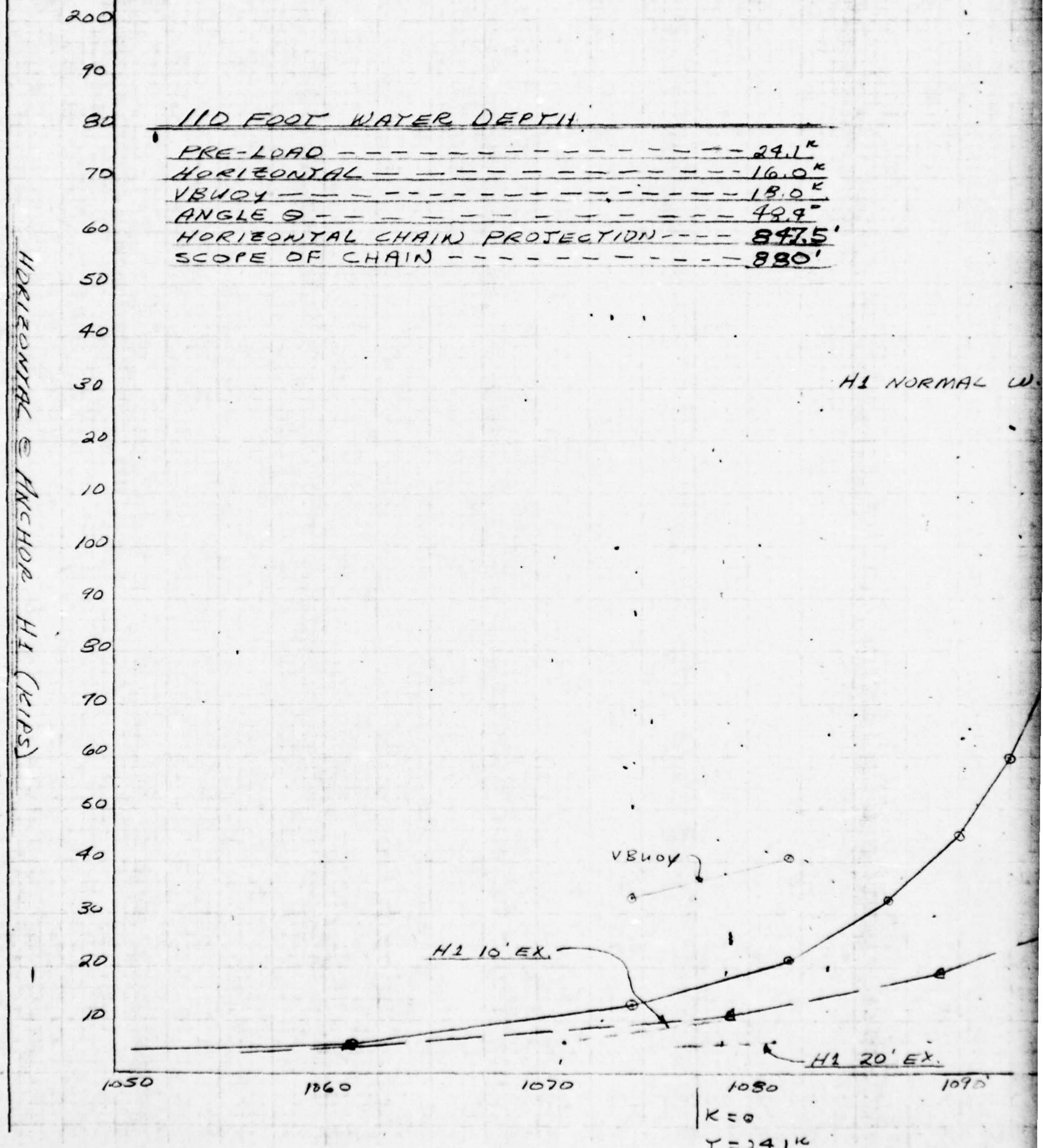
250
30
280

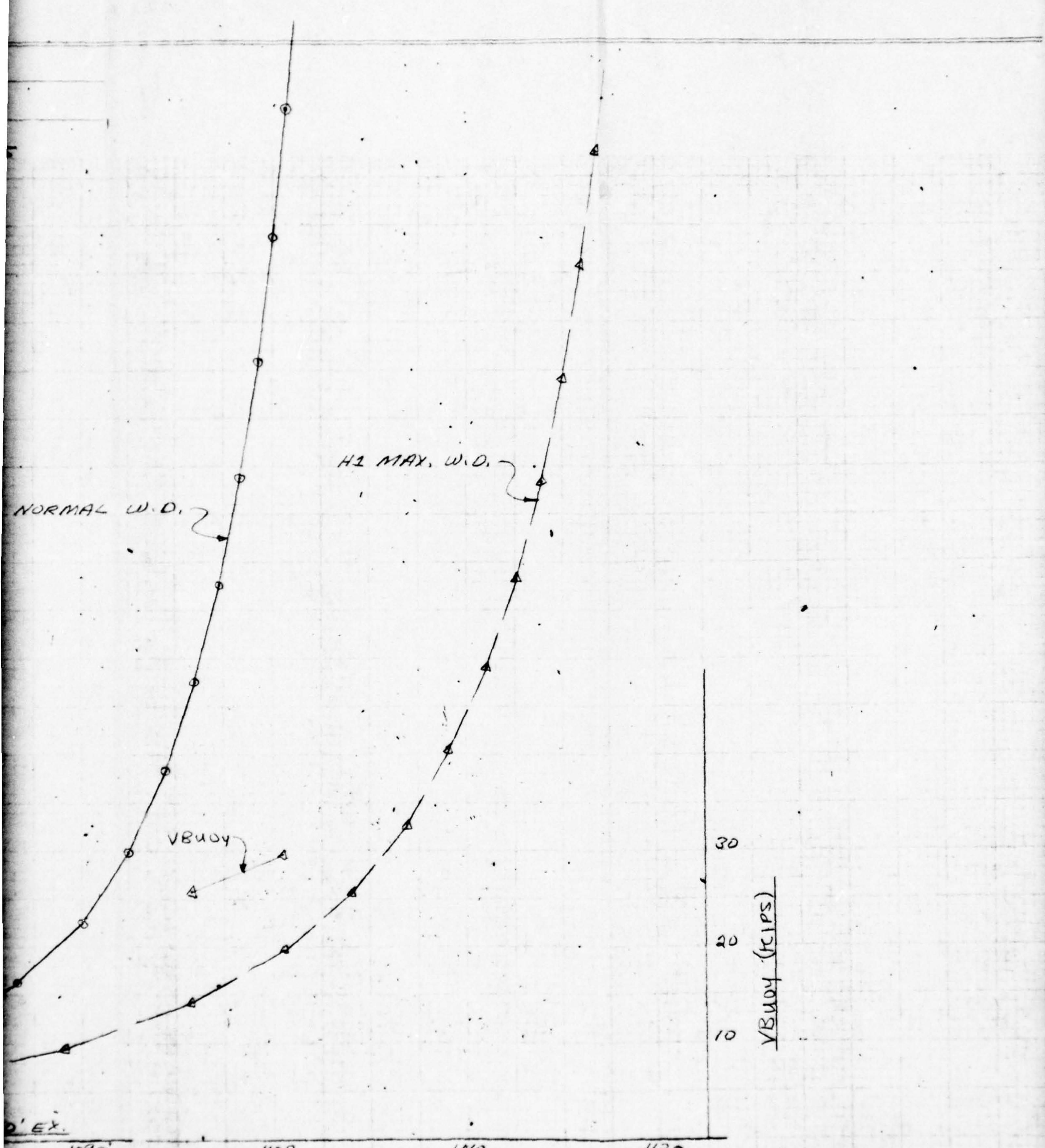
27
32

130
280
850
120
970

1110
970
140

1075
140
935

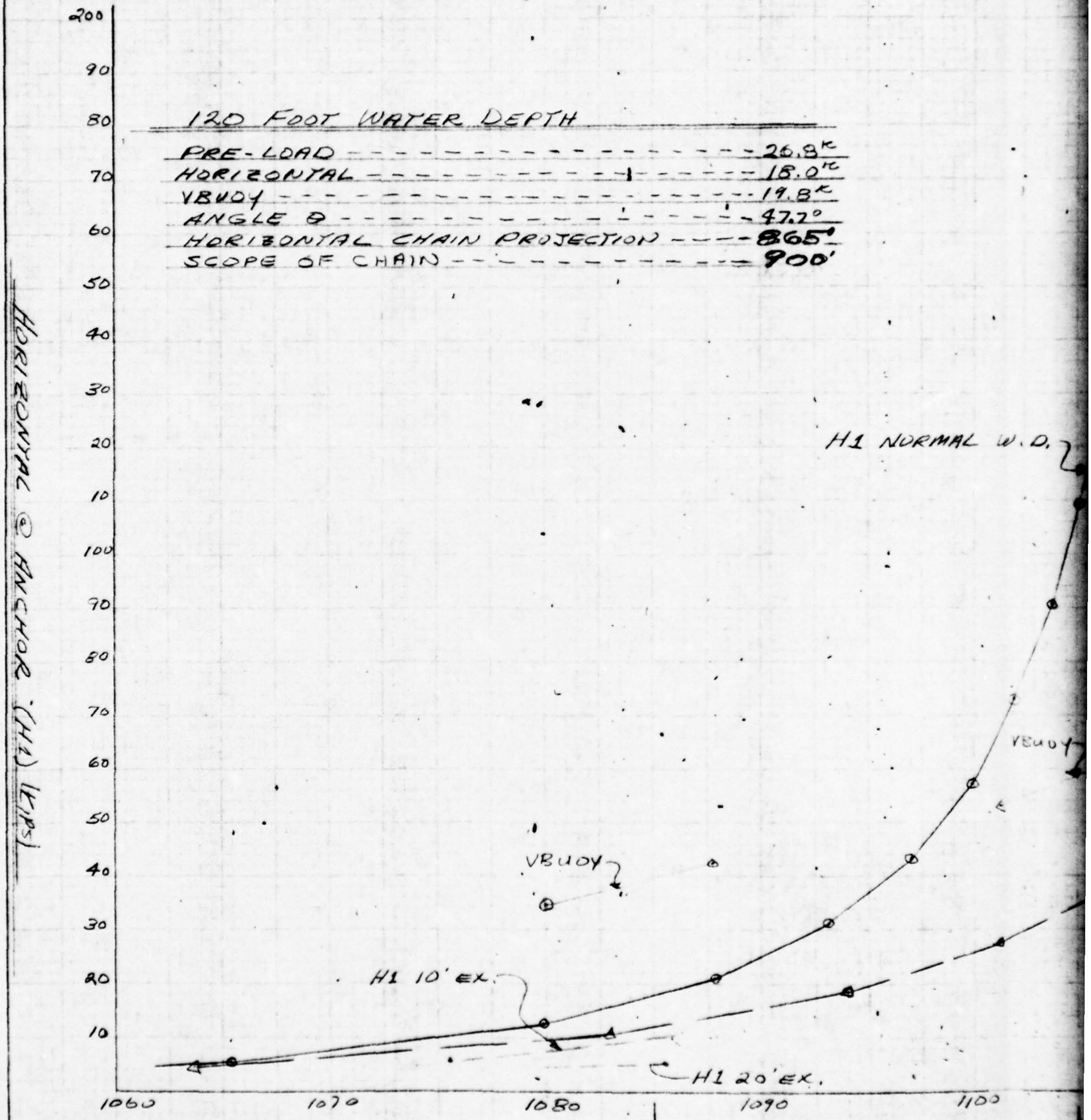



H1 MAX. W.D.
NORMAL W.D.
VBUOY
30
20
10
VBUOY (KIPS)
'EX.
1090
1100
1110
1120
K=0
T=42K

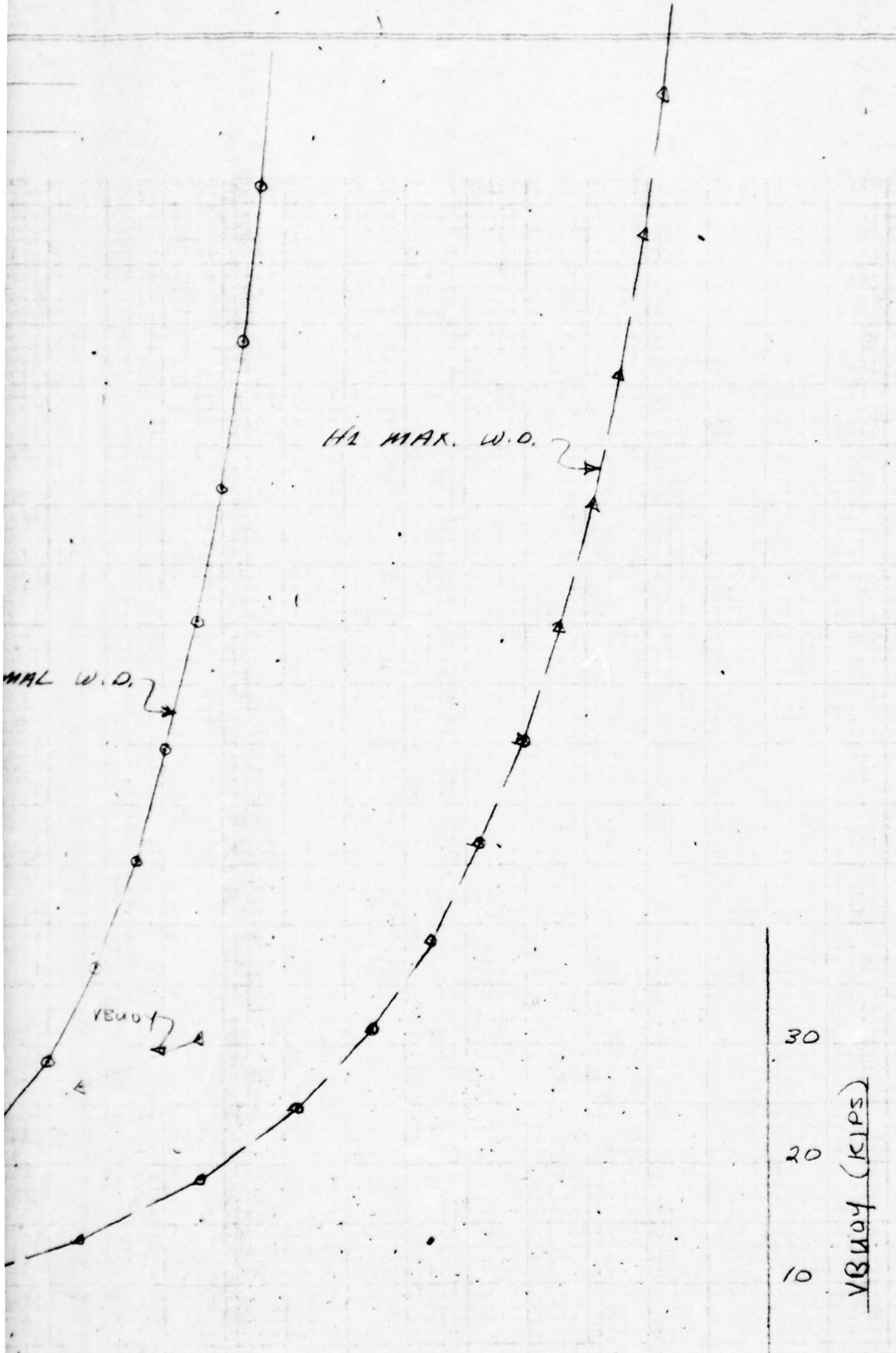
ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY/ERDL	SHEET NO: 8
SUBJECT: MONO-MOORING SYSTEM	
DRAWING NUMBER: JOB 56017	COMPUTER: ANDREWS
CHECKED BY:	DATE: 6-21-65



K=0
T=


H1 MAX. W.O.
MAL W.O.
VBUOY
30
20
10
VBUOY (KIPS)
1100
1110
1120
1130
K=0
T=45.3K

2

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

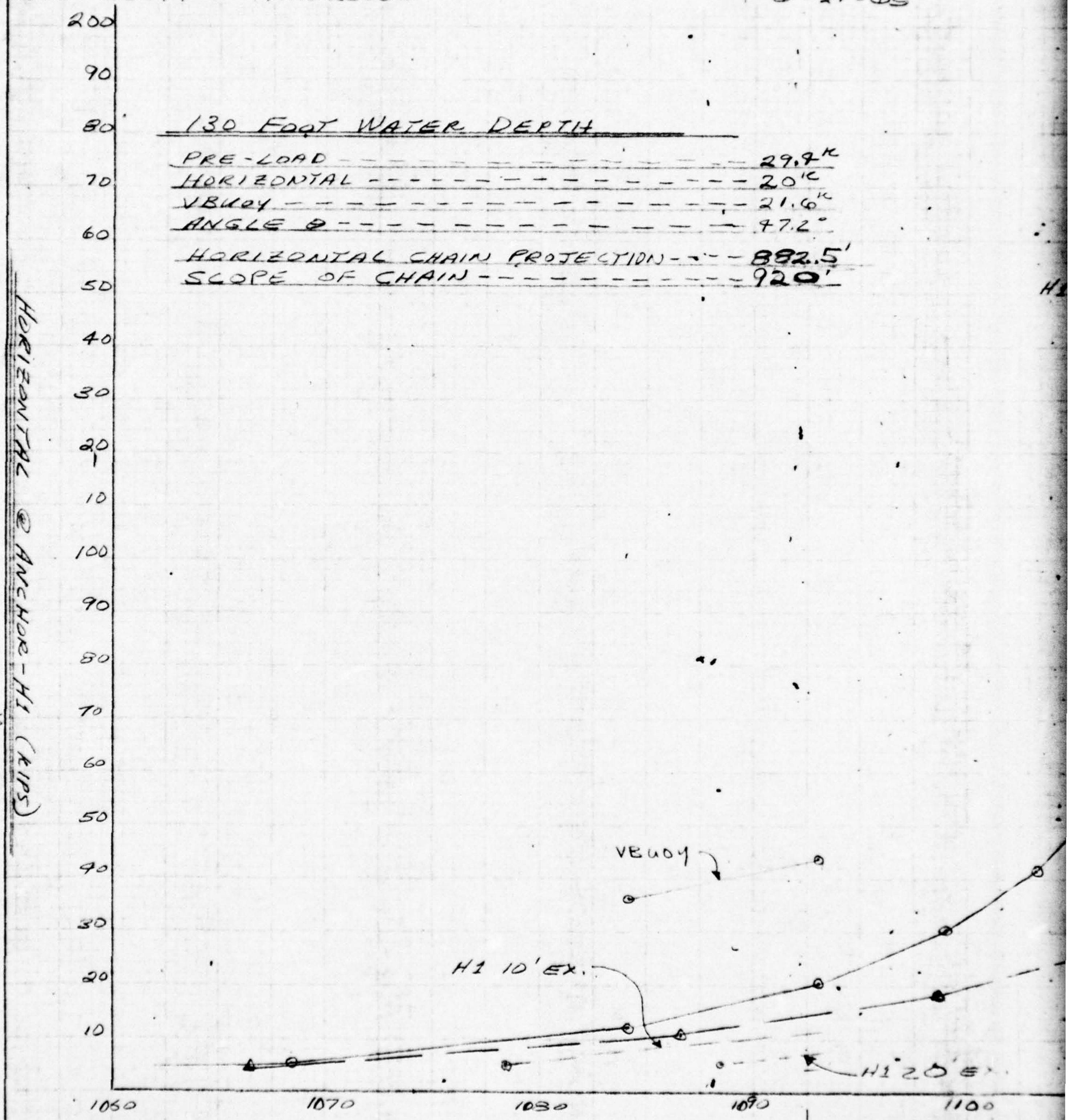
J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U. S. ARMY / ERDL	9
SUBJECT	
MONO - MOORING SYSTEM	

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-21-65

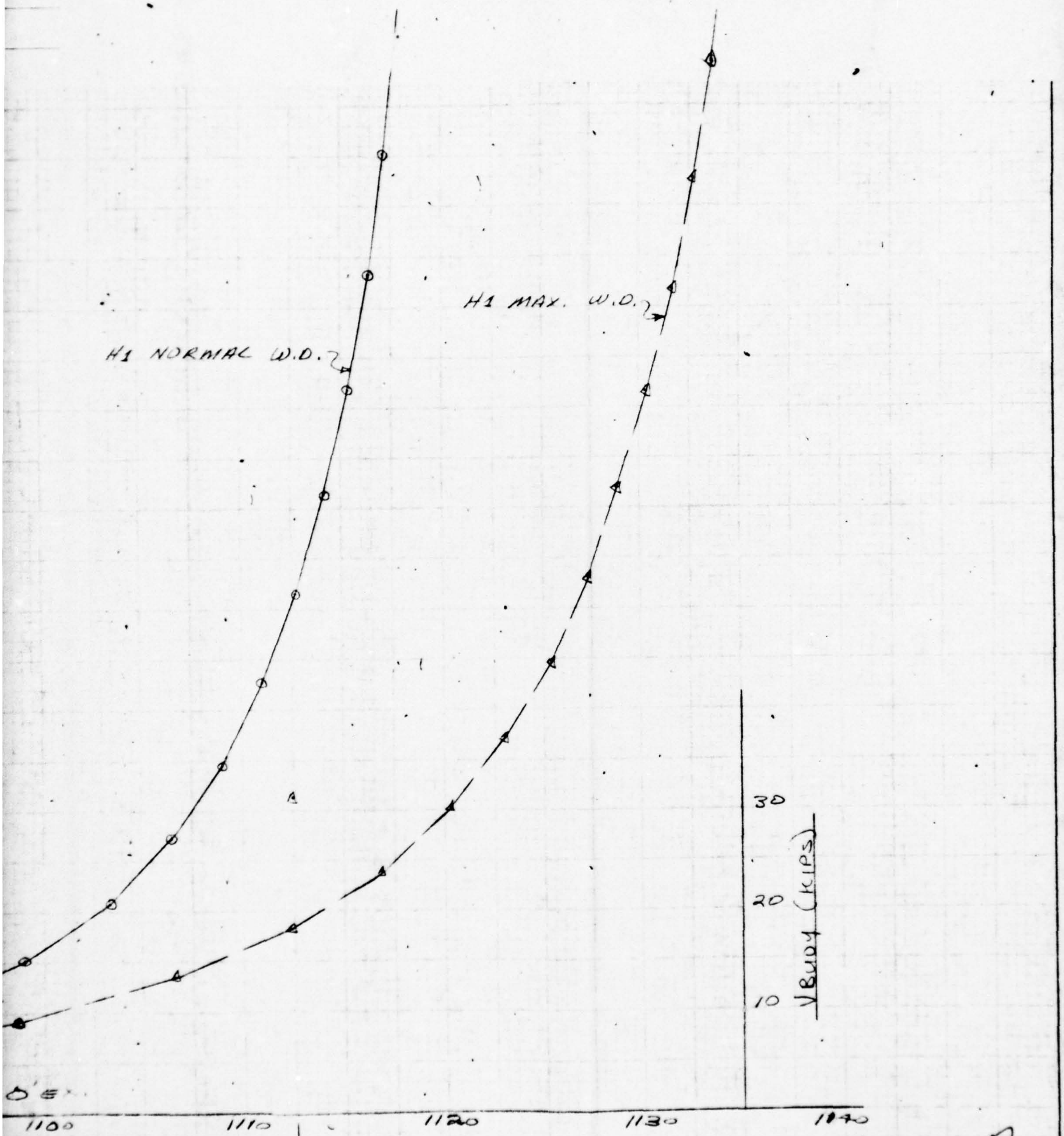
130 FOOT WATER DEPTH

PRE-LOAD ---------- 29.4k
HORIZONTAL ---------- 20k
VBUOY ---------- 21.6k
ANGLE θ ---------- 47.2°
HORIZONTAL CHAIN PROJECTION ---- 882.5'
SLOPE OF CHAIN ---------- 920'



K = 0
T = 29.4k

#125



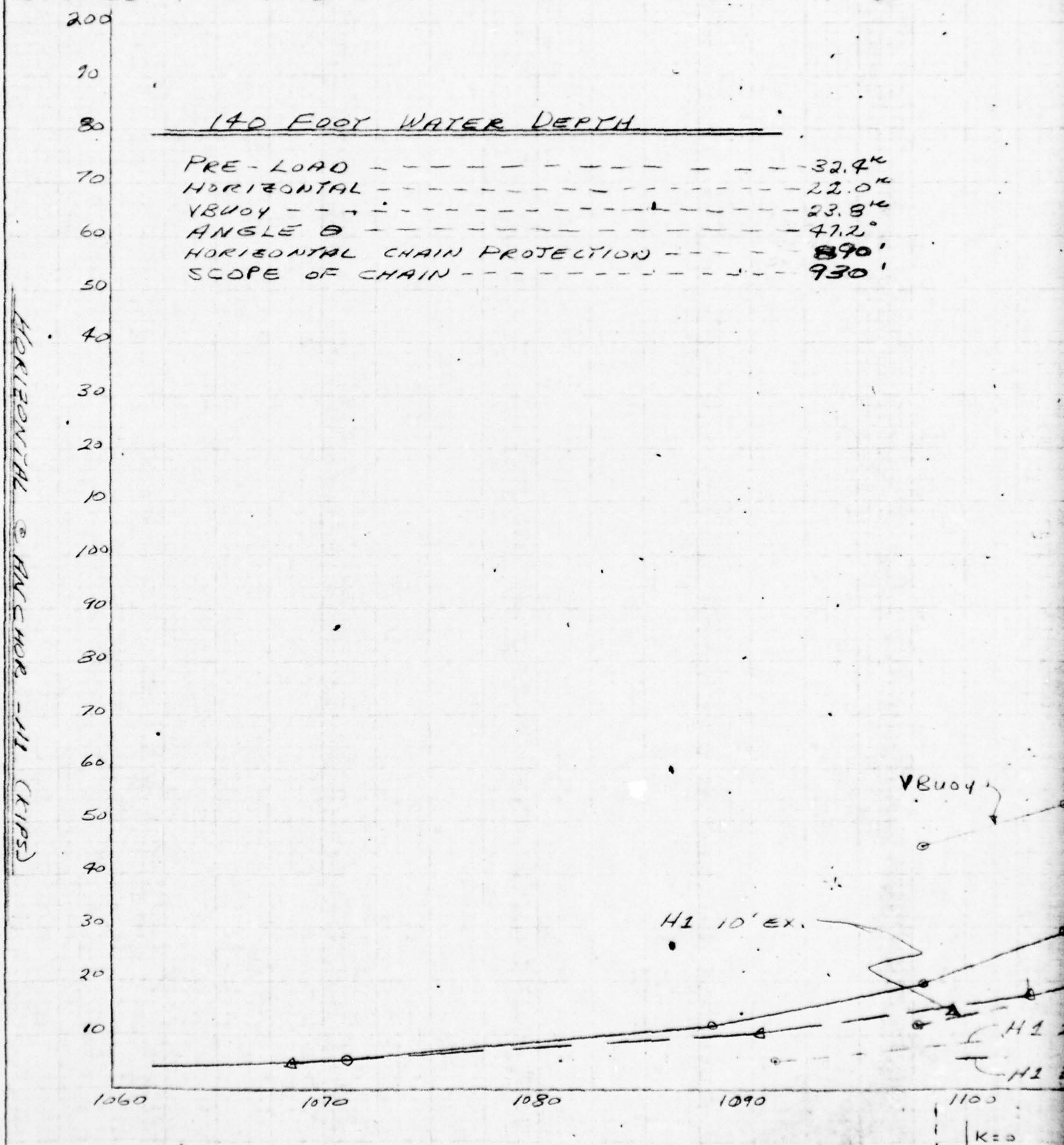
H1 NORMAL W.D.
H1 MAX. W.D.
30
20
10
VBODY (KIPS)
1100
1110
1120
1130
1140
K=0
T=48.5K

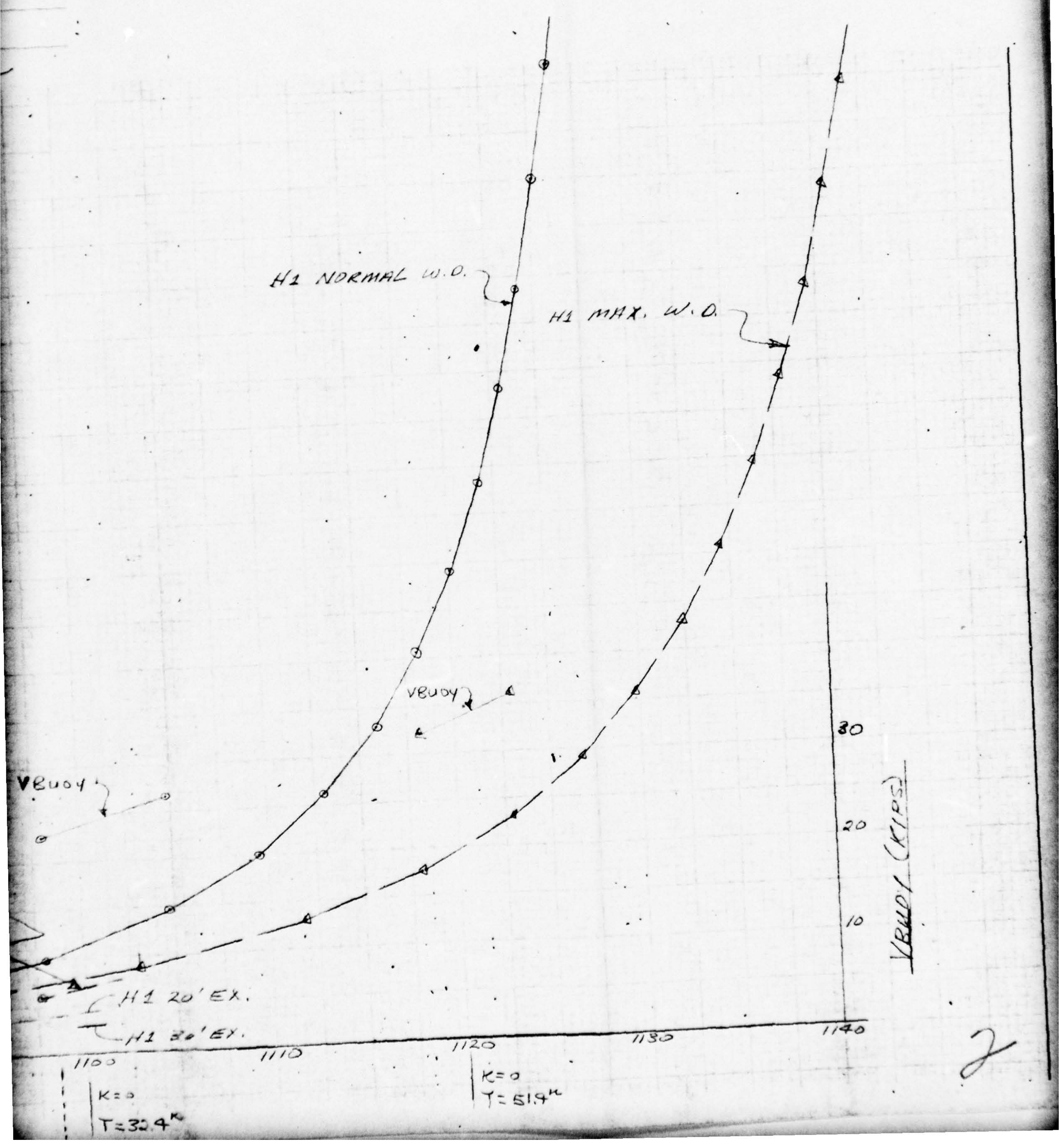
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / ERDL	SHEET NO.: 10
SUBJECT: MONO-MOORING SYSTEM	

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-21-65





H1 NORMAL W.O.
H1 MAX. W.O.
VBUOY
VBUOY
H1 20' EX.
H1 30' EX.
1100
1110
1120
1130
1140
10
20
30
VBUOY (KIPS)
K=0
T=32.4K
K=0
T=51.9K

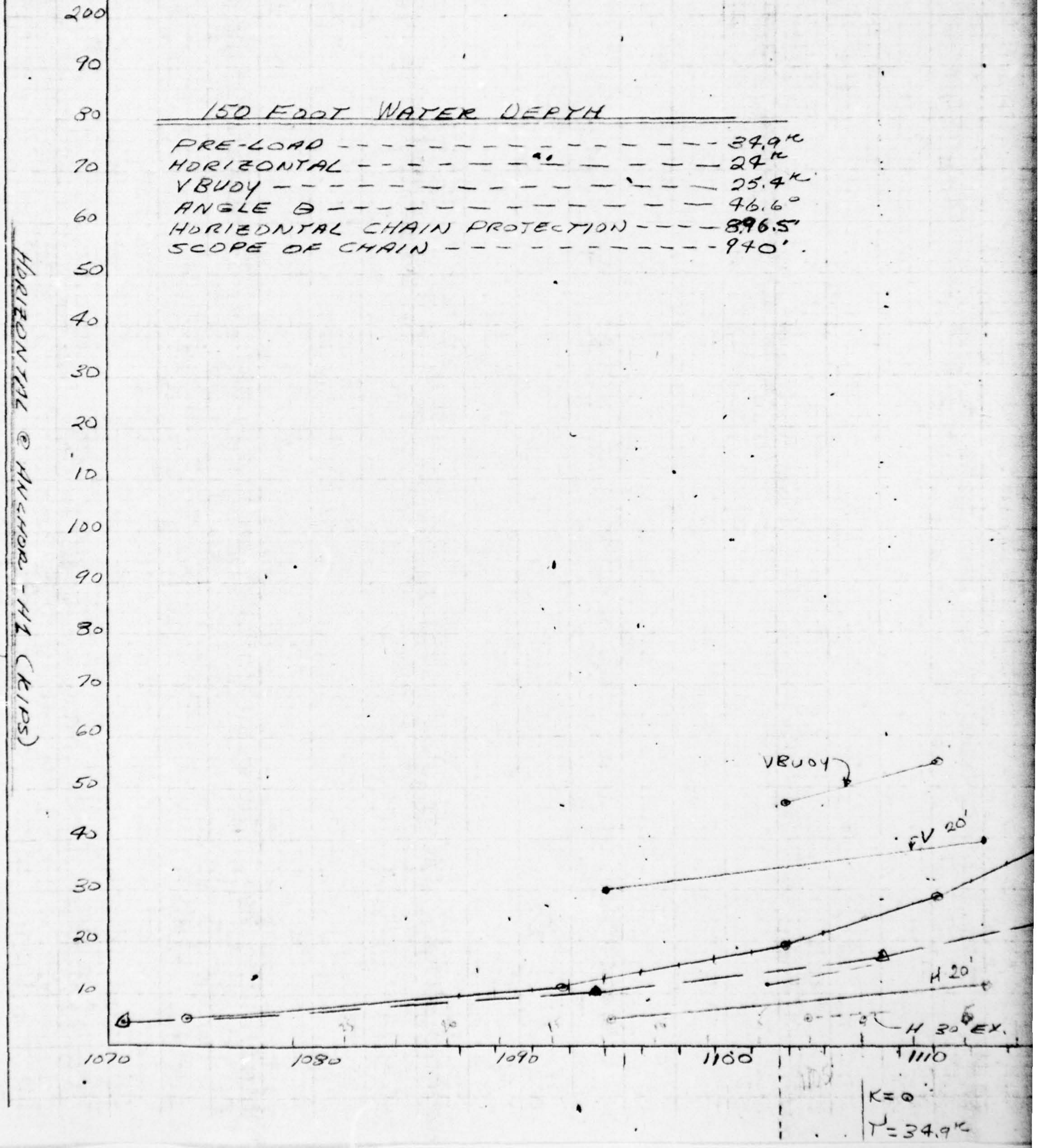
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & Co., INC.

COMPANY	SHEET NO
U.S. ARMY / ERDL	11

SUBJECT
MONO - MOORING SYSTEM

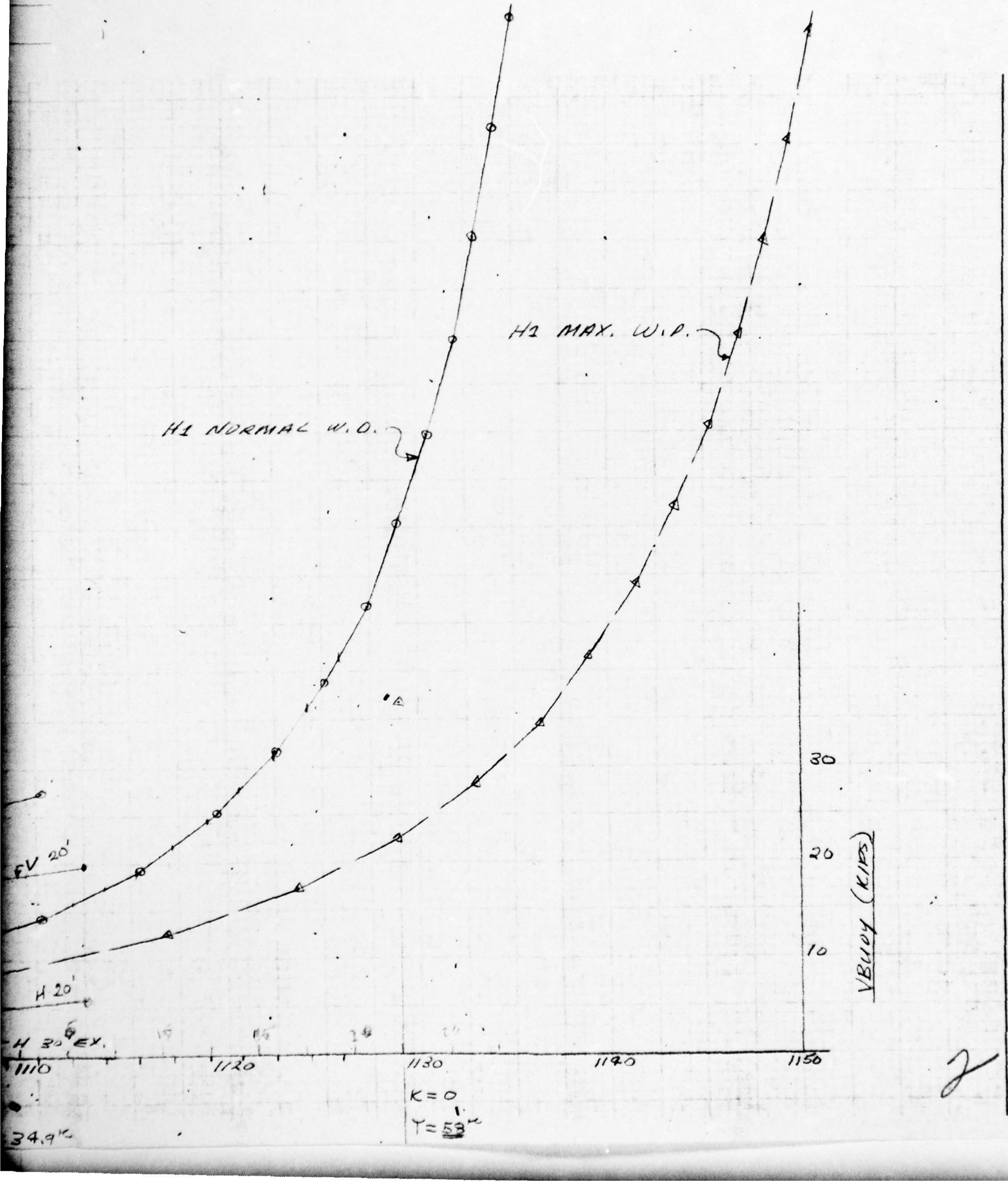
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6-21-65



1110
200
1170
1120
1090

1130
1170
60

1116.5
60
1056.5



H1 MAX. W.P.
H1 NORMAL W.O.
FV 20'
H 20'
H 30' EX.
1110
1120
1130
1140
1150
10
20
30
VBUOY (KIPS)
K=0
Y=53^K
34.9^K

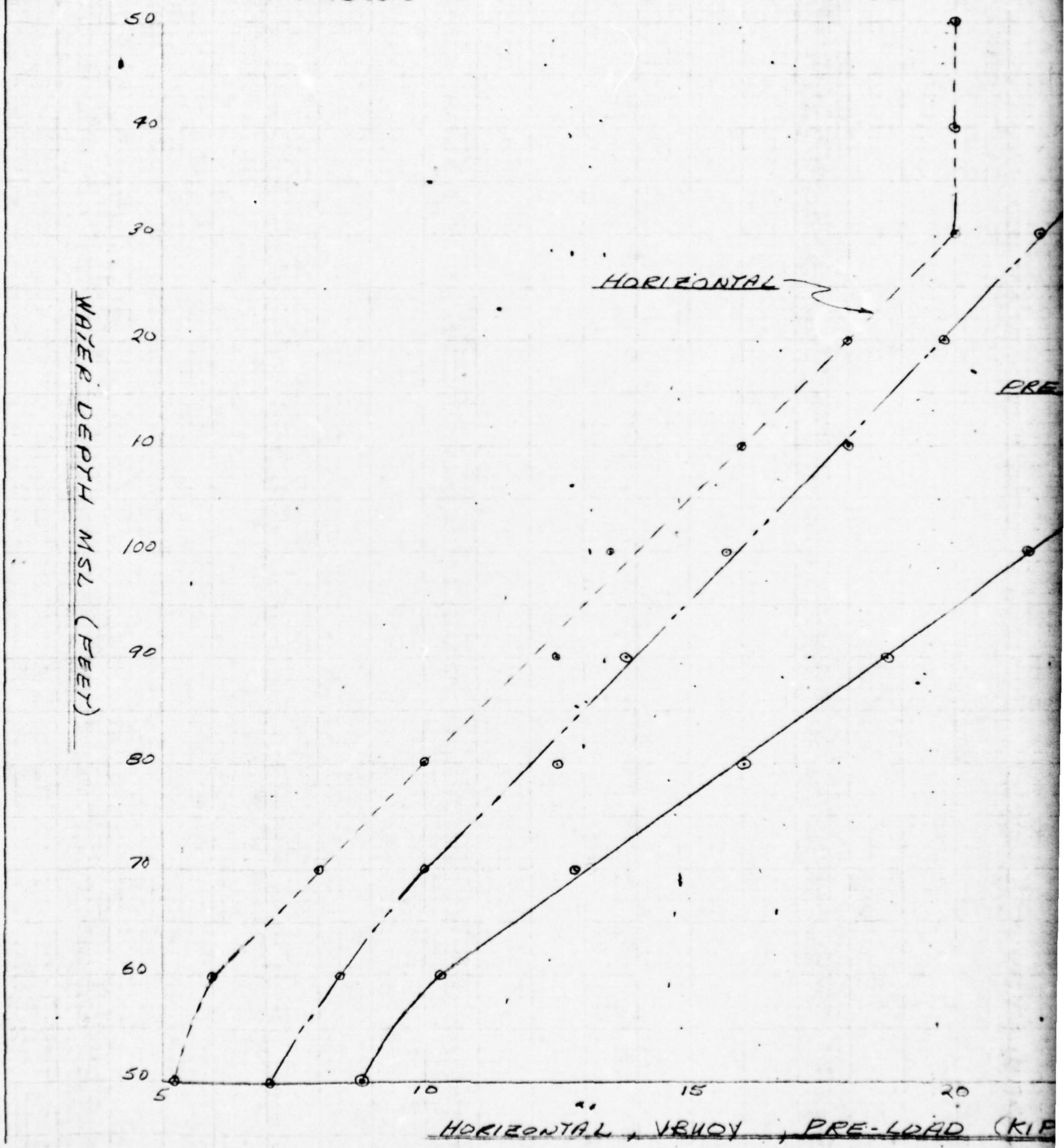
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

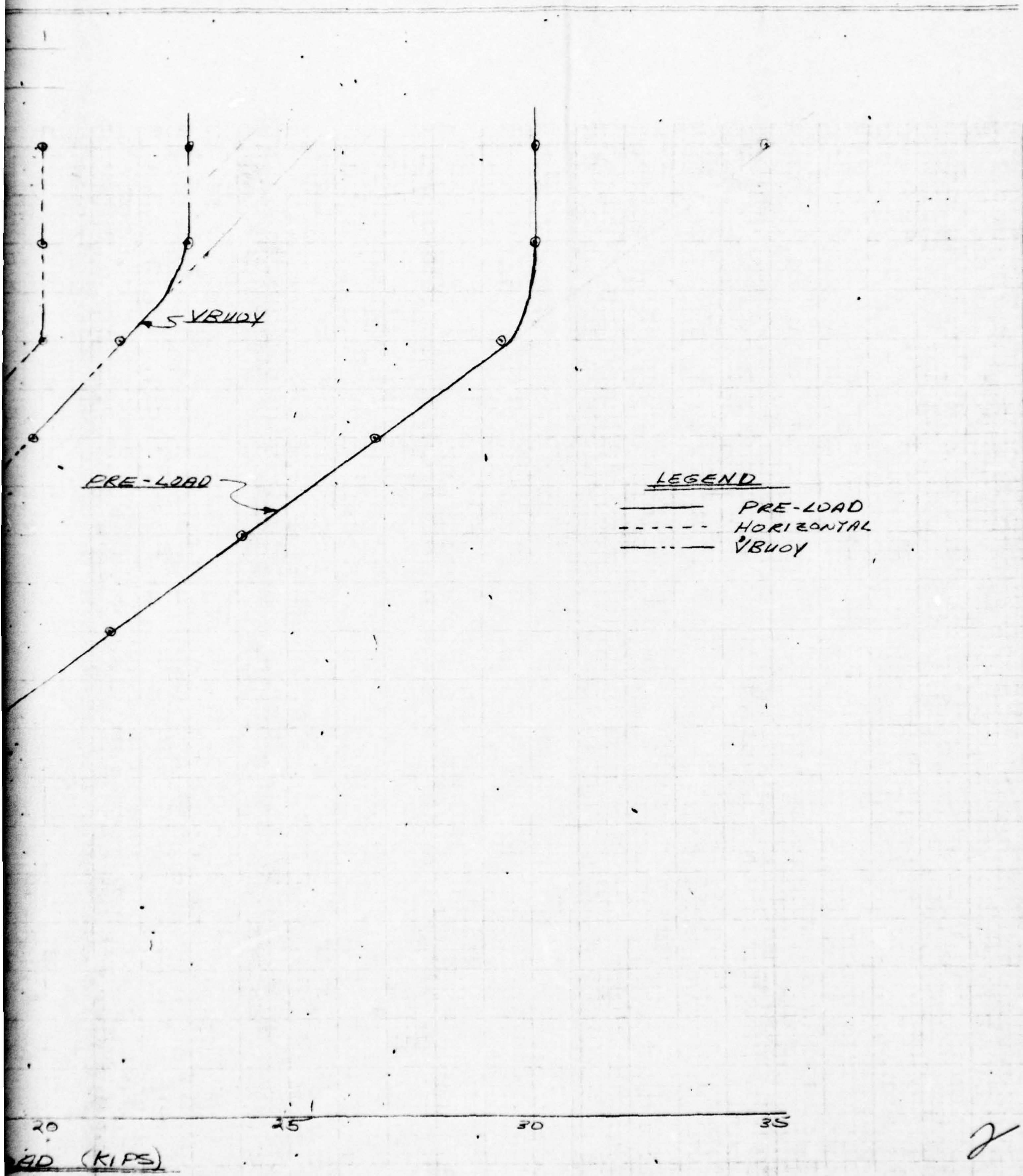
J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY/ERDL	12

SUBJECT: MONO-MOORING SYSTEM

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 55017	ANDREWS		6-22-65



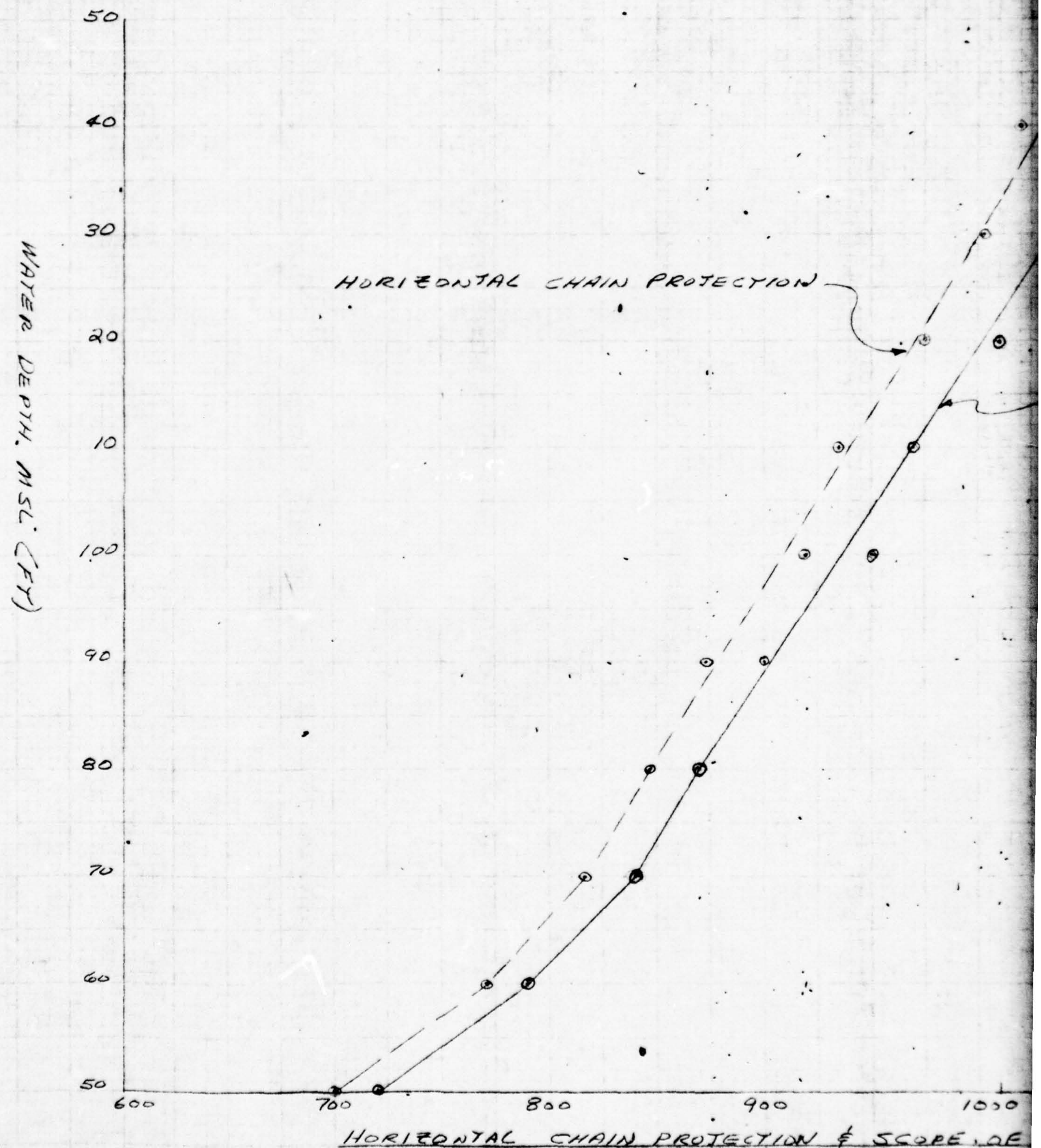


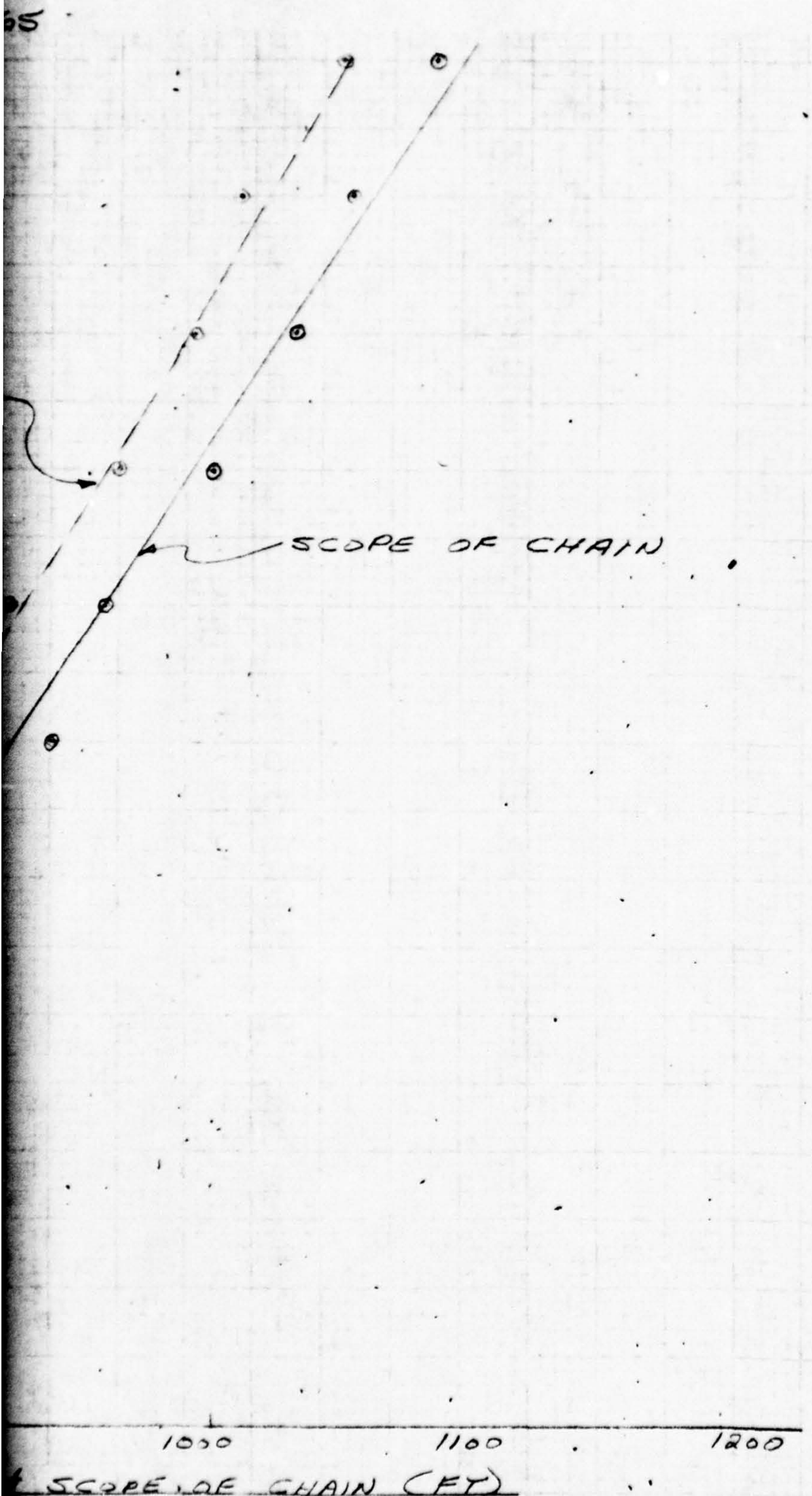
VBUOY
PRE-LOAD
LEGEND
PRE-LOAD
HORIZONTAL
VBUOY
20
25
30
35
AD (KIPS)

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY MCDERMOTT & CO., INC.

COMPANY: U.S. ARMY/ERDL
SHEET NO: 13
SUBJECT: MONO-MOORING SYSTEM
DRAWING NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 6-22-65



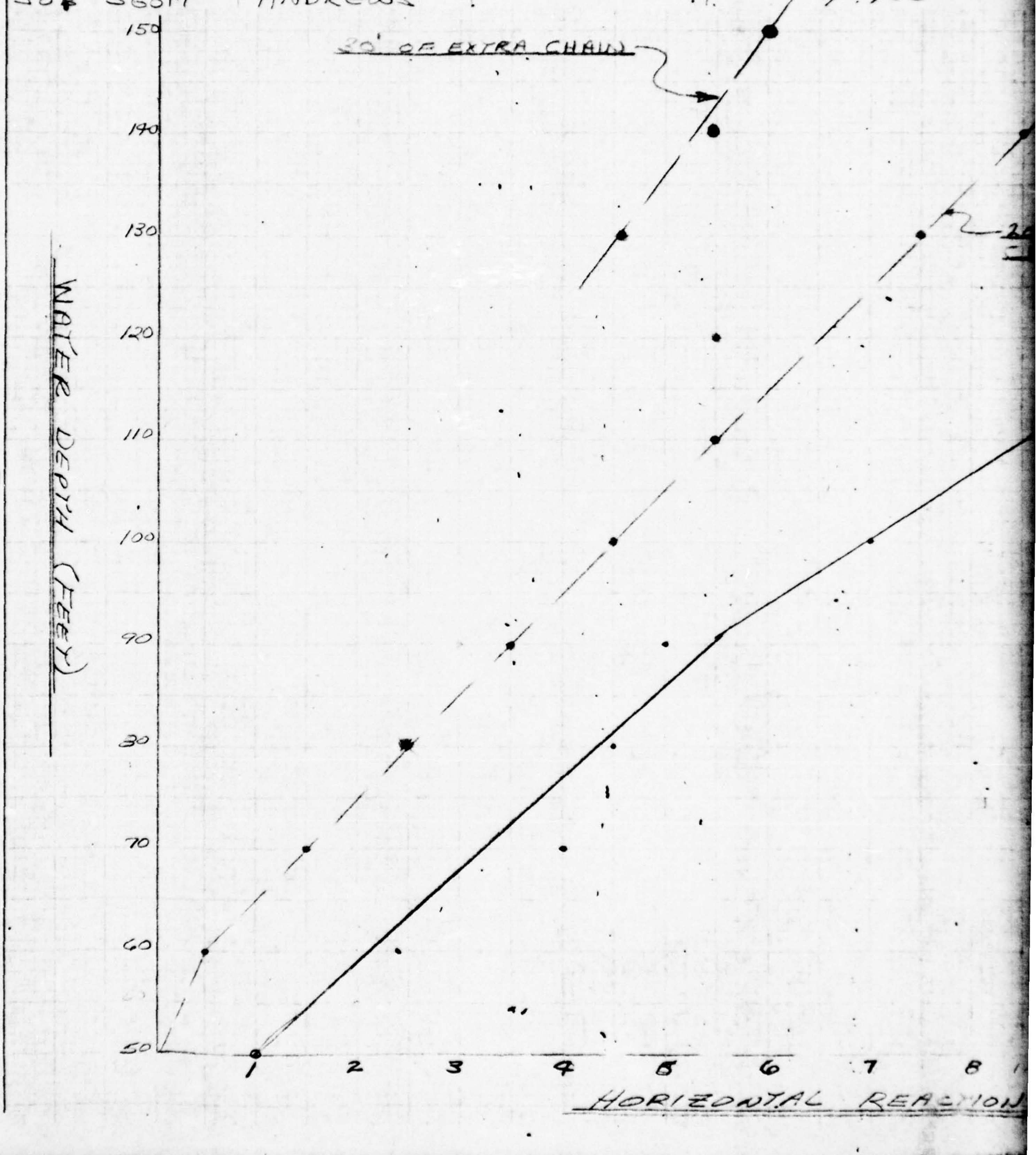


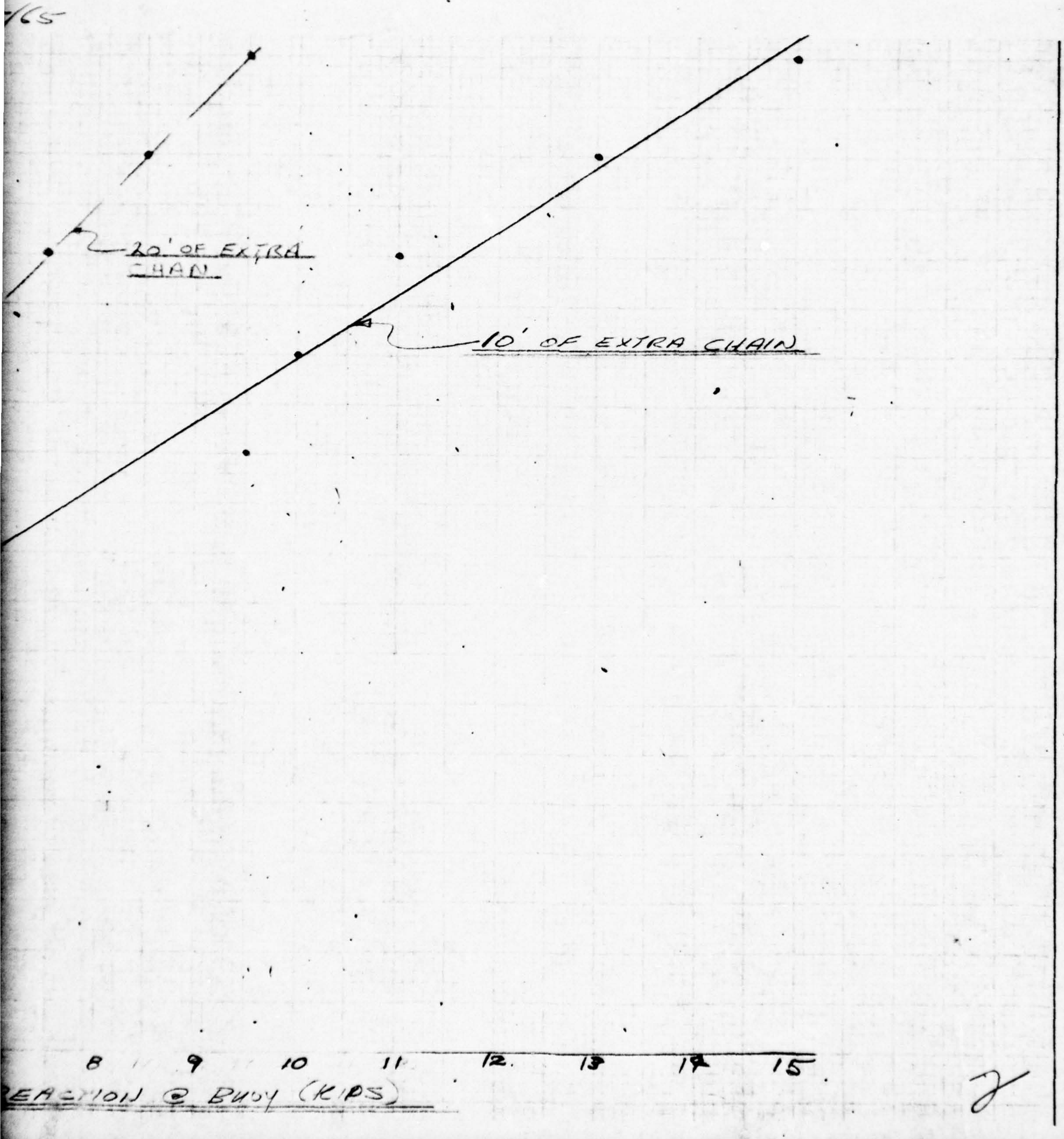
65
SCOPE OF CHAIN
1000
1100
1200
SCOPE OF CHAIN (FT)

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / ERDL
SHEET NO: 1
SUBJECT: MONO-MOORING SYSTEM
DRAWING NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 7/15/65





/65
20' OF EXTRA CHAIN
10' OF EXTRA CHAIN
8
9
10
11
12
13
14
15
REACTION @ BUOY (KIPS)

7

J. RAY McDERMOTT & CO., INC.

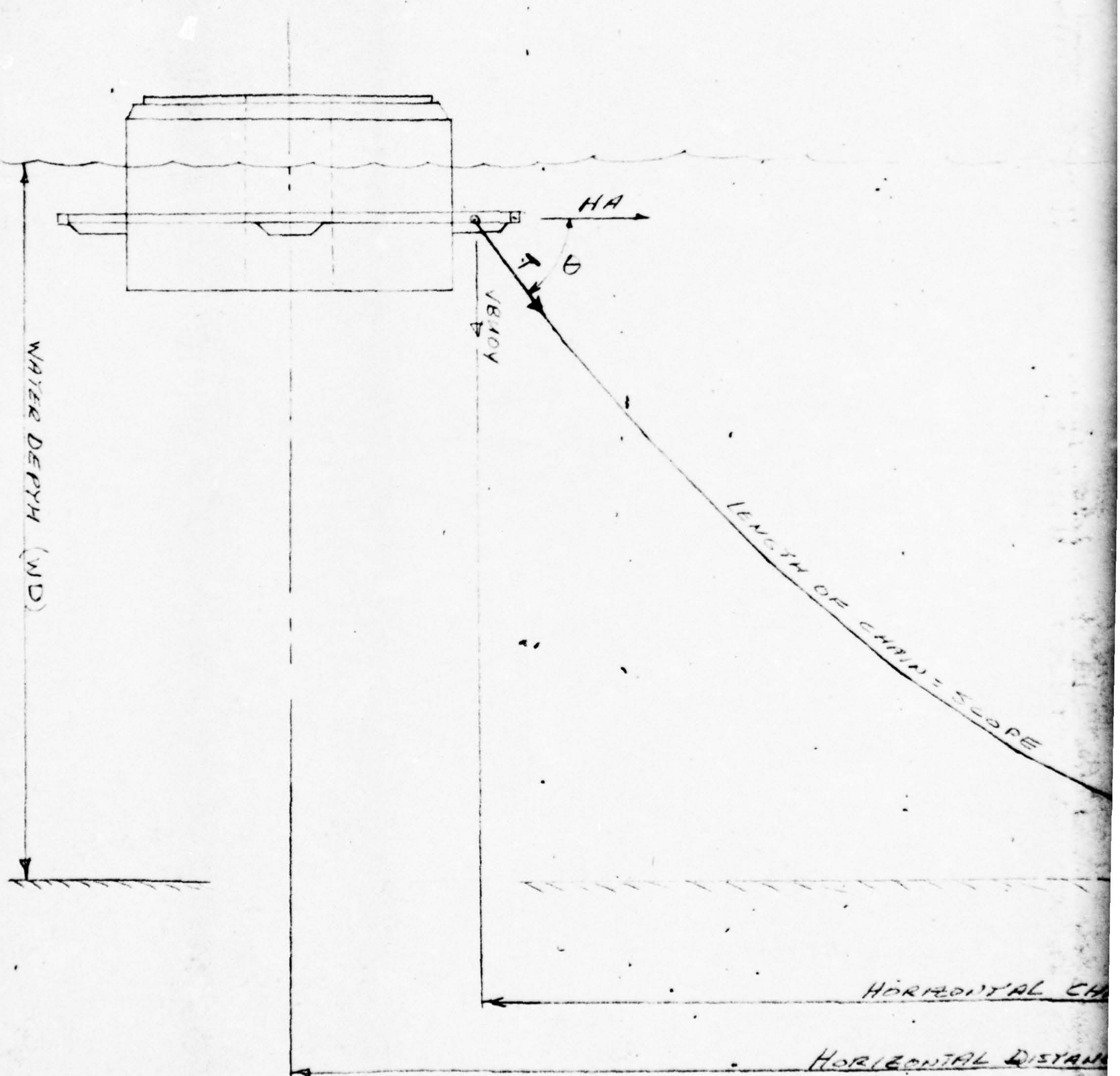
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. ______

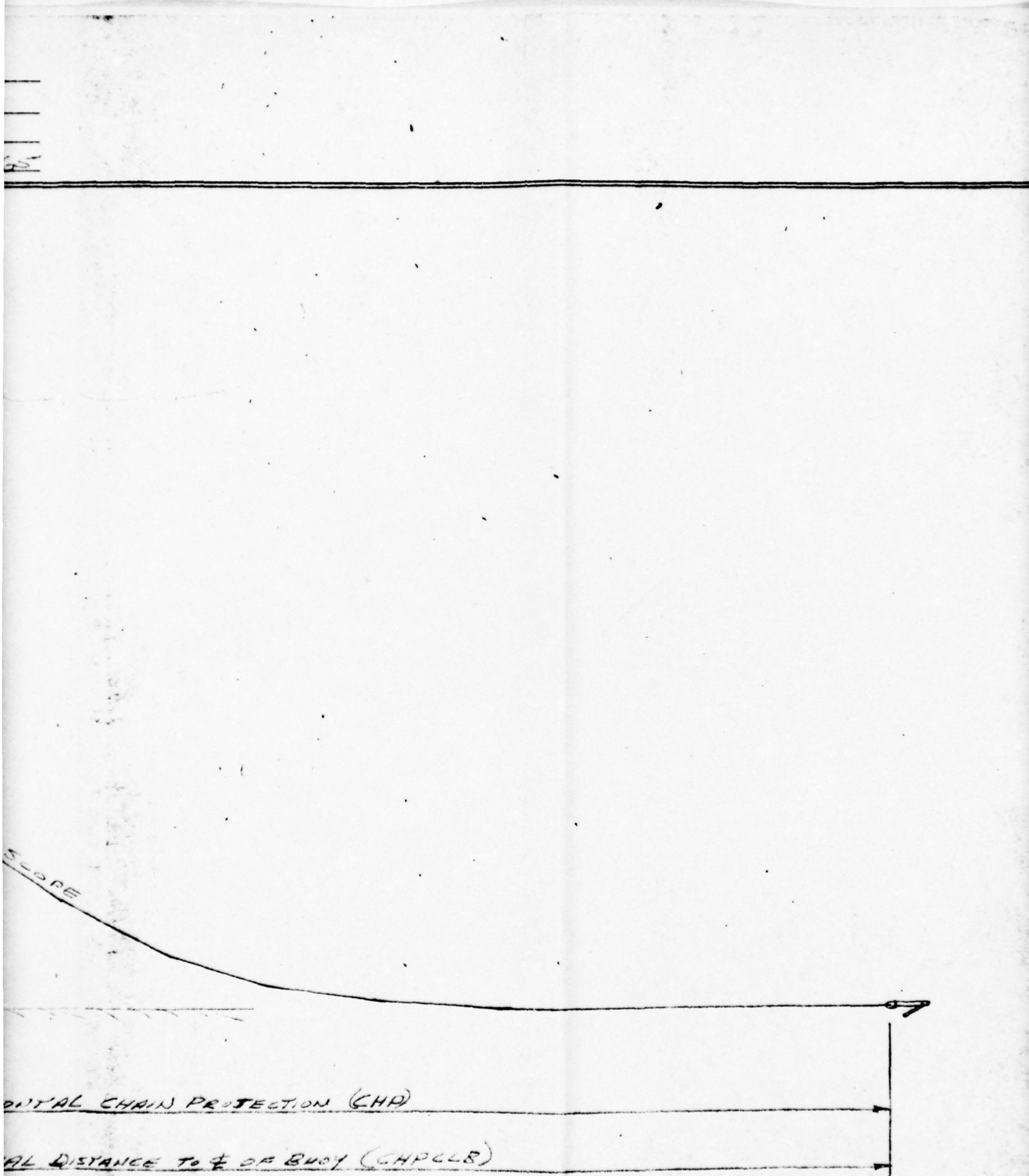
COMPANY U.S. ARMY / ERDL

SUBJECT MONO - MOORING SYSTEM

~~DRAWING~~ JOB NO. 56317 COMPUTER ANDREWS CHKD. BY ______ DATE 6-22- 1965



5177


SCOPE
ONTAL CHAIN PROJECTION (CHP)
AL DISTANCE TO ℄ OF BUOY (CHPCLB)

2

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET SHEET NO. ______

COMPANY U.S. ARMY/ERDL

SUBJECT MONO-MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-22 1965

INSTALLATION TABLE

WATER DEPTH WD (FEET)	PRE-LOAD T (KIPS)	HORIZONTAL HA (KIPS)	VERTICAL VBUOY (KIPS)	ANGLE θ (DEGREES)	SCOPE* (FEET)
50	8.8	5.28	7.05	53	730
60	10.3	6.0	8.4	54	790
70	12.8	8.0	10.0	51	660
80	16.0	10.0	12.5	51	900
90	18.6	12.0	13.8	50°	940
100	21.4	13.5	15.7	49°	975
110	24.1	16.0	18.0	48.4	1000
120	26.8	18.0	19.8	47.7	1020
130	29.4	20.0	21.6	47.2	1040
140	30.3	19.5	23.0	49.7°	1050
150	30.3	19.5	23.0	49.7°	1060

* SCOPE IS DETERMINED BY ADDING 120' OF CHAIN TO SCOPE REQ'D. FROM CURVES.

EXTRA CHAIN IS PROPORTIONED AS FOLLOWS:

50 FEET ANCHOR DRAG

50 FEET ANCHOR PLACEMENT ALLOWANCE

20 FEET INSTALLATION ALLOWANCE

3177

SHEET No.

6-22 1965

TABLE

...AL (...S)	ANGLE θ (DEGREES)	SCOPE* (FEET)	CHP (FEET)	CHPBCL (FEET)	BALLAST Compts. A&B
	53	730	669	686	YES
	54	790	725	742	YES
	51	860	792	809	YES
	51	900	832	849	YES
3	50°	940	868	885	YES
7	49°	975	900	917	No
	48.4	1000	923	940	No
3	47.7	1020	940	957	No
	47.2	1040	958	975	No
	49.7°	1050	964	981	No
	49.7°	1060	968	985	No

CHAIN

OWS:

ANCE

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.42	3.91	815.6942	815.6942	0.00
5.28	7.05	834.1105	18.4162	0.00
12.93	10.19	839.3158	5.2053	0.00
23.43	13.32	841.9554	2.6395	0.00
36.63	16.46	843.5039	1.5484	0.00
52.56	19.59	844.5409	1.0369	0.00
71.46	22.73	845.3172	.7763	0.00
93.06	25.87	845.8896	.5723	0.00
117.36	29.00	846.3313	.4417	0.00
144.36	32.14	846.6843	.3529	0.00
174.36	35.27	846.9831	.2988	0.00
174.36	35.27	846.9831	0.0000	0.00
207.36	38.41	847.2378	.2546	0.00
243.36	41.55	847.4564	.2186	0.00
280.86	44.68	847.6194	.1630	0.00
322.86	47.82	847.7889	.1695	0.00
365.46	50.95	847.9099	.1210	0.00
413.46	54.09	848.0421	.1322	0.00
461.46	57.23	848.1343	.0922	0.00
515.46	60.36	848.2453	.1110	0.00
569.46	63.50	848.3285	.0832	0.00
626.46	66.63	848.3995	.0710	0.00

50' W.D. NORMAL 1A

H=0. DELTA=3.0 VPCC=45. WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=50. A2=400 A3=400 M=1

8

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.39	5.48	816.8751	816.8751	0.00
4.74	8.62	842.2695	25.3943	0.00
11.01	11.75	850.4478	8.1783	0.00
19.20	14.89	854.7917	4.3438	0.00
29.31	18.03	857.5246	2.7328	0.00
41.34	21.16	859.4127	1.8881	0.00
55.44	24.30	860.8449	1.4322	0.00
71.34	27.43	861.8999	1.0549	0.00
89.04	30.57	862.7165	.8166	0.00
108.84	33.71	863.4060	.6894	0.00
130.74	36.84	863.9903	.5842	0.00
130.74	36.84	863.9903	0.0000	0.00
154.14	39.98	864.4465	.4561	0.00
179.64	43.11	864.8498	.4032	0.00
207.24	46.25	865.2066	.3568	0.00
236.64	49.39	865.5127	.3061	0.00
267.84	52.52	865.7767	.2640	0.00
301.14	55.66	866.0152	.2385	0.00
337.14	58.79	866.2461	.2309	0.00
373.44	61.93	866.4188	.1727	0.00
412.44	65.07	866.5911	.1723	0.00
454.44	68.20	866.7615	.1704	0.00

50' W.D. MAX. 1B

H = 0. DELTA = 3.0 VPCC = 65 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1 = 70 A2=400 A3 = 400 M = 1

7

270
10
260

370
260
610

10

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.40	4.70	816.1758	816.1758	0.00
4.96	7.83	838.3755	22.1997	0.00
11.80	10.97	845.0964	6.7209	0.00
20.89	14.11	848.5371	3.4407	0.00
32.29	17.24	850.6907	2.1535	0.00
46.09	20.38	852.1938	1.5030	0.00
61.99	23.51	853.2321	1.0383	0.00
80.29	26.65	854.0446	.8124	0.00
100.69	29.79	854.6626	.6180	0.00
123.49	32.92	855.1751	.5125	0.00
148.39	36.06	855.5869	.4118	0.00
148.39	36.06	855.5869	0.0000	0.00
175.99	39.19	855.9549	.3679	0.00
205.99	42.33	856.2681	.3131	0.00
237.19	45.47	856.5031	.2350	0.00
271.39	48.60	856.7296	.2265	0.00
307.99	51.74	856.9329	.2033	0.00
346.99	54.87	857.1091	.1762	0.00
387.49	58.01	857.2590	.1499	0.00
430.69	61.15	857.3992	.1402	0.00
476.29	64.28	857.5273	.1281	0.00
524.29	67.42	857.6417	.1144	0.00

60 W.D. NORMAL 2A

H=0. DELTA=3.0 VPCC=55. WW=0 W(1)=.0754 TOL=.1

W(3)=.0734 W(5)=.0734 A1=60 A2=400 A3=400 M=1

840
190
650

860
670
190

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.84	7.05	830.2668	830.2668	0.00
5.13	10.19	854.0942	23.8274	0.00
11.01	13.32	863.6312	9.5369	0.00
18.45	16.46	869.0178	5.3866	0.00
27.45	19.59	872.5294	3.5115	0.00
38.04	22.73	875.0351	2.5057	0.00
50.16	25.87	876.8855	1.8504	0.00
63.96	29.00	878.3642	1.4787	0.00
79.26	32.14	879.5198	1.1556	0.00
96.06	35.27	880.4525	.9326	0.00
114.36	38.41	881.2230	.7705	0.00
114.36	38.41	881.2230	0.0000	0.00
134.46	41.55	881.9069	.6838	0.00
156.06	44.68	882.4837	.5767	0.00
179.16	47.82	882.9777	.4940	0.00
203.76	50.95	883.4061	.4284	0.00
229.86	54.09	883.7837	.3776	0.00
257.76	57.23	884.1294	.3457	0.00
287.16	60.36	884.4364	.3070	0.00
318.06	63.50	884.7102	.2738	0.00
351.06	66.63	884.9744	.2642	0.00
384.66	69.77	885.1883	.2139	0.00

60' W.D. MAX. 2B

H=0.3 DELTA=3. VPCC=80 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=90 A2=400 A3=400 M=1

590
220
670

8A

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.39	5.48	816.8751	816.8751	0.00
4.74	8.62	842.2695	25.3943	0.00
11.01	11.75	850.4478	8.1783	0.00
19.20	14.89	854.7917	4.3438	0.00
29.31	18.03	857.5246	2.7328	0.00
41.34	21.16	859.4127	1.8881	0.00
55.44	24.30	860.8449	1.4322	0.00
71.34	27.43	861.8999	1.0549	0.00
89.04	30.57	862.7165	.8166	0.00
108.84	33.71	863.4060	.6894	0.00
130.74	36.84	863.9903	.5842	0.00
130.74	36.84	863.9903	0.0000	0.00
154.14	39.98	864.4465	.4561	0.00
179.64	43.11	864.8498	.4032	0.00
207.24	46.25	865.2066	.3568	0.00
236.64	49.39	865.5127	.3061	0.00
267.84	52.52	865.7767	.2640	0.00
301.14	55.66	866.0152	.2385	0.00
337.14	58.79	866.2461	.2309	0.00
373.44	61.93	866.4188	.1727	0.00
412.44	65.07	866.5911	.1723	0.00
454.44	68.20	866.7615	.1704	0.00

(12)

70' W.D. NORMAL 3A

H=0. Δ=3. VPCC=65. WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=70 A2=400 A3=400 M=1

870
740
130

846.5
130.0
716.5

3B

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.81	7.83	830.8668	830.8668	0.00
5.01	10.97	857.5774	26.7105	0.00
10.56	14.11	868.2554	10.6780	0.00
17.52	17.24	874.5165	6.2611	0.00
25.92	20.38	878.7233	4.2068	0.00
35.64	23.51	881.6425	2.9192	0.00
46.77	26.65	883.8618	2.2192	0.00
59.37	29.79	885.6316	1.7697	0.00
73.23	32.92	887.0009	1.3692	0.00
88.53	36.06	888.1450	1.1441	0.00
105.33	39.19	889.1242	.9792	0.00
105.33	39.19	889.1242	0.0000	0.00
123.33	42.33	889.9215	.7972	0.00
142.83	45.47	890.6242	.7027	0.00
163.83	48.60	891.2458	.6216	0.00
186.03	51.74	891.7727	.5269	0.00
210.03	54.87	892.2695	.4968	0.00
234.93	58.01	892.6769	.4074	0.00
261.33	61.15	893.0501	.3732	0.00
289.23	64.28	893.3915	.3414	0.00
318.33	67.42	893.6929	.3014	0.00
348.93	70.55	893.9732	.2803	0.00

70' WD MAX. 3B

H=0 Δ=3 VPCC=90 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=130 A2=400 A3=400 M=1

4 A

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.48	6.27	820.0744	820.0744	0.00
4.71	9.40	846.7020	26.6276	0.00
10.65	12.54	856.0923	9.3902	0.00
18.27	15.67	861.1951	5.1028	0.00
27.57	18.81	864.4533	3.2581	0.00
38.67	21.95	866.8017	2.3484	0.00
51.27	25.08	868.4389	1.6372	0.00
65.67	28.22	869.7498	1.3109	0.00
81.87	31.35	870.8135	1.0636	0.00
99.57	34.49	871.6422	.8287	0.00
119.07	37.63	872.3483	.7060	0.00
119.07	37.63	872.3483	0.0000	0.00
140.37	40.76	872.9536	.6053	0.00
163.17	43.90	873.4538	.5001	0.00
187.77	47.03	873.8937	.4399	0.00
213.87	50.17	874.2689	.3752	0.00
241.77	53.31	874.6056	.3367	0.00
271.77	56.44	874.9187	.3131	0.00
302.67	59.58	875.1737	.2550	0.00
335.67	62.71	875.4129	.2392	0.00
370.47	65.85	875.6338	.2209	0.00
406.77	68.99	875.8318	.1980	0.00

19

80' W.D. NORMAL 4-A

H=0 Δ=3. VPCC = 74 WW=0. W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=80 A2=400 A3=400 M=1

830
720
110

856
110
746

4B

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.81	8.62	831.7789	831.7789	0.00
4.89	11.75	860.5548	28.7759	0.00
10.23	14.89	872.7154	12.1606	0.00
16.83	18.03	879.8681	7.1527	0.00
24.63	21.16	884.5544	4.6863	0.00
33.72	24.30	887.9985	3.4441	0.00
44.07	27.43	890.6116	2.6130	0.00
55.65	30.57	892.6484	2.0368	0.00
68.55	33.71	894.3222	1.6738	0.00
82.65	36.84	895.6788	1.3565	0.00
97.95	39.98	896.8046	1.1258	0.00
97.95	39.98	896.8046	0.0000	0.00
114.75	43.11	897.8163	1.0116	0.00
132.45	46.25	898.6213	.8050	0.00
151.65	49.39	899.3620	.7407	0.00
172.05	52.52	900.0046	.6426	0.00
193.65	55.66	900.5684	.5638	0.00
216.45	58.79	901.0684	.5000	0.00
240.75	61.93	901.5342	.4658	0.00
265.95	65.07	901.9328	.3986	0.00
292.95	68.20	902.3239	.3911	0.00
320.55	71.34	902.6480	.3241	0.00

80' W.D. MAX. 4B

H=0 Δ=3. VPCC = 100 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=110 A2=400 A3=400 M=1

910
140
770

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.48	7.05	1020.7070	1020.7070	0.00
5.85	10.97	1053.4851	32.7781	0.00
13.53	14.89	1064.1190	10.6339	0.00
23.58	18.81	1069.8828	5.7638	0.00
35.91	22.73	1073.4621	3.5793	0.00
50.61	26.65	1075.9693	2.5072	0.00
67.71	30.57	1077.8317	1.8624	0.00
86.97	34.49	1079.2099	1.3782	0.00
108.87	38.41	1080.3617	1.1518	0.00
132.87	42.33	1081.2559	.8942	0.00
158.97	46.25	1081.9756	.7197	0.00
158.97	46.25	1081.9756	0.0000	0.00
187.77	50.17	1082.6176	.6420	0.00
218.67	54.09	1083.1480	.5304	0.00
251.97	58.01	1083.6120	.4640	0.00
287.97	61.93	1084.0306	.4186	0.00
325.77	65.85	1084.3782	.3476	0.00
365.97	69.77	1084.6919	.3137	0.00
408.57	73.69	1084.9742	.2823	0.00
453.57	77.61	1085.2258	.2516	0.00
501.57	81.53	1085.4695	.2437	0.00
550.77	85.45	1085.6712	.2017	0.00

15

90' W.D. NORMAL 5A

H=0. Δ=3. VPCC=84. WW=0. W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=90 A2=500 A3=500 M=1

1090
920
270

1063
270
793

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.81	9.40	1032.5987	1032.5987	0.00
5.97	13.32	1067.5464	34.9477	0.00
12.93	17.24	1081.2710	13.7246	0.00
21.66	21.16	1089.0518	7.7808	0.00
32.16	25.08	1094.1458	5.0940	0.00
44.46	29.00	1097.7904	3.6446	0.00
58.56	32.92	1100.5310	2.7406	0.00
74.46	36.84	1102.6682	2.1372	0.00
91.98	40.76	1104.3254	1.6572	0.00
111.48	44.68	1105.7442	1.4188	0.00
132.78	48.60	1106.9266	1.1824	0.00
132.78	48.60	1106.9266	0.0000	0.00
155.58	52.52	1107.8828	.9562	0.00
180.48	56.44	1108.7496	.8668	0.00
206.88	60.36	1109.4705	.7209	0.00
235.08	64.28	1110.1073	.6368	0.00
265.38	68.20	1110.6949	.5876	0.00
297.18	72.12	1111.1964	.5015	0.00
330.78	76.04	1111.6510	.4546	0.00
366.78	79.96	1112.0859	.4349	0.00
403.38	83.88	1112.4322	.3463	0.00
442.38	87.80	1112.7689	.3367	0.00

90 W.D. MAX. 5B

H=0 A=3 VPCC=110 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=120 A2=500 A3=500 M=1

1120
300
820

6 A

(17)

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.57	7.83	1024.1073	1024.1073	0.00
5.85	11.75	1058.0617	33.9544	0.00
13.20	15.67	1069.7462	11.6845	0.00
22.68	19.59	1076.2263	6.4801	0.00
34.26	23.51	1080.3656	4.1393	0.00
47.94	27.43	1083.2555	2.8899	0.00
63.84	31.35	1085.4437	2.1882	0.00
81.63	35.27	1087.0515	1.6078	0.00
101.73	39.19	1088.3864	1.3349	0.00
123.93	43.11	1089.4667	1.0803	0.00
147.93	47.03	1090.3218	.8551	0.00
147.93	47.03	1090.3218	0.0000	0.00
174.33	50.95	1091.0809	.7591	0.00
202.83	54.87	1091.7276	.6467	0.00
233.43	58.79	1092.2850	.5574	0.00
265.83	62.71	1092.7546	.4696	0.00
300.63	66.63	1093.1865	.4319	0.00
337.53	70.55	1093.5673	.3808	0.00
376.53	74.47	1093.9096	.3423	0.00
417.63	78.39	1094.2153	.3057	0.00
460.83	82.31	1094.4898	.2745	0.00
505.83	86.23	1094.7364	.2466	0.00

100' W.D. NORMAL 6A

H=0 Δ=3. VPCC = 93 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=100 A2=500 A3=500 M=1

1100
355
245

1070
245
825

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.81	10.19	1033.3406	1033.3406	0.00
5.88	14.11	1070.7078	37.3672	0.00
12.57	18.03	1085.6460	14.9382	0.00
20.91	21.95	1094.3523	8.7063	0.00
30.84	25.87	1100.0467	5.6944	0.00
42.45	29.79	1104.1931	4.1464	0.00
55.65	33.71	1107.2813	3.0882	0.00
70.50	37.63	1109.7119	2.4306	0.00
87.00	41.55	1111.6748	1.9629	0.00
105.12	45.47	1113.2838	1.6090	0.00
124.92	49.39	1114.6420	1.3582	0.00
124.92	49.39	1114.6420	0.0000	0.00
146.22	53.31	1115.7694	1.1274	0.00
169.32	57.23	1116.7684	.9990	0.00
193.92	61.15	1117.6177	.8493	0.00
220.32	65.07	1118.3824	.7647	0.00
248.22	68.99	1119.0453	.6629	0.00
277.62	72.91	1119.6264	.5811	0.00
308.82	76.83	1120.1604	.5340	0.00
341.82	80.75	1120.6506	.4902	0.00
376.02	84.67	1121.0718	.4212	0.00
412.32	88.59	1121.4789	.4071	0.00

100' W.D. MAX. 6B

H=0 Δ=3 VPcc = 120 WW=0 W(1)=.0787 TOL=.1

W(3)=.0787 W(5)=.0787 A1 = 130 A2=500 A3=500 M=1

1130
275
855

19

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.57	8.62	1024.7986	1024.7986	0.00
5.70	12.54	1061.2336	36.4350	0.00
12.75	16.46	1074.5207	13.2871	0.00
21.69	20.38	1081.8809	7.3602	0.00
32.52	24.30	1086.6364	4.7555	0.00
45.24	28.22	1089.9851	3.3487	0.00
59.94	32.14	1092.5264	2.5413	0.00
76.44	36.06	1094.4468	1.9204	0.00
95.04	39.98	1096.0404	1.5936	0.00
115.20	43.90	1097.2594	1.2190	0.00
137.70	47.82	1098.3576	1.0982	0.00
137.70	47.82	1098.3576	0.0000	0.00
161.70	51.74	1099.2246	.8670	0.00
187.80	55.66	1099.9933	.7687	0.00
215.70	59.58	1100.6508	.6575	0.00
245.70	63.50	1101.2402	.5894	0.00
277.20	67.42	1101.7356	.4954	0.00
311.10	71.34	1102.2048	.4692	0.00
346.50	75.26	1102.6048	.4000	0.00
384.00	79.18	1102.9722	.3674	0.00
423.30	83.10	1103.3038	.3316	0.00
465.30	87.02	1103.6257	.3219	0.00

110' W.D. NORMAL 7A

H=0 Δ=3 VPCC=103 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=110 A2=500 A3=500 M=1

1110
830
230

1077.5
230
847.5

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.15	10.19	1009.5471	1009.5471	0.00
4.89	14.11	1061.1948	51.6477	0.00
11.19	18.03	1079.1609	17.9661	0.00
18.99	21.95	1089.2049	10.0440	0.00
28.32	25.87	1095.8219	6.6170	0.00
39.18	29.79	1100.5467	4.7248	0.00
51.57	33.71	1104.1028	3.5561	0.00
65.49	37.63	1106.8816	2.7788	0.00
80.94	41.55	1109.1154	2.2338	0.00
98.04	45.47	1110.9946	1.8792	0.00
116.43	49.39	1112.4891	1.4945	0.00
116.43	49.39	1112.4891	0.0000	0.00
136.53	53.31	1113.8086	1.3195	0.00
158.13	57.23	1114.9353	1.1267	0.00
181.23	61.15	1115.9089	.9736	0.00
205.83	65.07	1116.7613	.8524	0.00
232.23	68.99	1117.5440	.7827	0.00
259.83	72.91	1118.2062	.6622	0.00
288.93	76.83	1118.8017	.5955	0.00
319.83	80.75	1119.3582	.5565	0.00
351.93	84.67	1119.8416	.4834	0.00
385.83	88.59	1120.2982	.4566	0.00

110' W.D. MAX. 7B

H=0 Δ=3 VPCC=128 NN=0 W(1)=.0789 TOL=.1

W(3)=.0789 W(5)=.0789 A1=130 A2=500 A3=500 M=1

1130
260
880

J. RAY McDERMOTT & CO., INC. ENGINEERS AND GENERAL CONTRACTORS NEW ORLEANS, LA

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.64	9.40	1027.6701	1027.6701	0.00
5.71	13.32	1065.3684	37.6983	0.00
12.55	17.24	1079.7703	14.4019	0.00
21.10	21.16	1087.8236	8.0533	0.00
31.42	25.08	1093.1524	5.3288	0.00
43.48	29.00	1096.9285	3.7761	0.00
57.31	32.92	1099.7732	2.8447	0.00
72.91	36.84	1101.9940	2.2208	0.00
90.31	40.76	1103.7860	1.7920	0.00
109.24	44.68	1105.1920	1.4060	0.00
130.24	48.60	1106.4401	1.2481	0.00
130.24	48.60	1106.4401	0.0000	0.00
152.74	52.52	1107.4498	1.0097	0.00
177.04	56.44	1108.3263	.8765	0.00
203.14	60.36	1109.0935	.7672	0.00
230.74	64.28	1109.7440	.6505	0.00
260.74	68.20	1110.3690	.6250	0.00
291.64	72.12	1110.8690	.5000	0.00
324.64	76.04	1111.3393	.4703	0.00
359.44	79.96	1111.7652	.4259	0.00
396.04	83.88	1112.1537	.3885	0.00
435.04	87.80	1112.5290	.3753	0.00

10

120' W.D. NORMAL 8A

H=0 Δ=3 VPCC=112 WW=0 W(1)=.0787 TOL=.1

W(3)=.0787 W(5)=.0787 A1=120 A2=500 A3=500 M=1

1120
-900
220

1085
220
865

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.15	10.97	1009.5395	1009.5395	0.00
4.83	14.89	1063.7148	54.1753	0.00
10.95	18.81	1083.0122	19.2974	0.00
18.48	22.73	1094.0380	11.0258	0.00
27.42	26.65	1101.3295	7.2915	0.00
37.77	30.57	1106.5561	5.2266	0.00
49.56	34.49	1110.5343	3.9782	0.00
62.76	38.41	1113.6445	3.1102	0.00
77.46	42.33	1116.1966	2.5521	0.00
93.39	46.25	1118.2080	2.0114	0.00
110.85	50.17	1119.9457	1.7377	0.00
110.85	50.17	1119.9457	0.0000	0.00
129.75	54.09	1121.4300	1.4843	0.00
150.15	58.01	1122.7250	1.2950	0.00
171.75	61.93	1123.8087	1.0837	0.00
195.15	65.85	1124.8223	1.0136	0.00
219.45	69.77	1125.6475	.8252	0.00
245.55	73.69	1126.4315	.7840	0.00
272.85	77.61	1127.1110	.6795	0.00
301.65	81.53	1127.7331	.6221	0.00
331.95	85.45	1128.3036	.5705	0.00
363.75	89.37	1128.8280	.5244	0.00

120' W.D. MAX 8B

H=0 Δ=3 VPCC=138 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=140 A2=500 A3=500 M=1

1170
350
890

900

22

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.64	10.19	1028.3242	1028.3242	0.00
5.62	14.11	1068.3911	40.0669	0.00
12.22	18.03	1084.1131	15.7220	0.00
20.41	21.95	1093.1028	8.9897	0.00
30.19	25.87	1099.0308	5.9280	0.00
41.59	29.79	1103.2995	4.2687	0.00
54.58	33.71	1106.5046	3.2051	0.00
69.28	37.63	1109.0711	2.5665	0.00
85.48	41.55	1111.0778	2.0067	0.00
103.24	45.47	1112.7172	1.6394	0.00
122.74	49.39	1114.1282	1.4110	0.00
122.74	49.39	1114.1282	0.0000	0.00
143.74	53.31	1115.3020	1.1738	0.00
166.54	57.23	1116.3452	1.0432	0.00
190,54	61.15	1117.1940	.8488	0.00
216.64	65.07	1117.9990	.8050	0.00
243.94	68.99	1118.6695	.6705	0.00
273.04	72.91	1119.2863	.6168	0.00
303.64	76.83	1119.8308	.5445	0.00
336.04	80.75	1120.3351	.5043	0.00
369.94	84.67	1120.7833	.4482	0.00
405.34	88.59	1121.1894	.4061	0.00

130' W.D. NORMAL 9A

H=0 Δ=3 VPCC=122 WW=0. W(1)=.0789 TOL=.1

W(3)=.0789 W(5)=.0787 A1=130 A2=500 A3=500 M=1

1130
920
210

1092.5
210
882.5

9B

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.15	11.75	1009.6715	1009.6715	0.00
4.80	15.67	1066.2997	56.6282	0.00
10.74	19.59	1086.6479	20.3482	0.00
18.03	23.51	1098.6454	11.9975	0.00
26.64	27.43	1106.6485	8.0031	0.00
36.57	31.35	1112.4193	5.7708	0.00
47.82	35.27	1116.7973	4.3780	0.00
60.42	39.19	1120.2671	3.4698	0.00
74.28	43.11	1123.0270	2.7599	0.00
89.58	47.03	1125.3727	2.3457	0.00
106.08	50.95	1127.2863	1.9136	0.00
106.08	50.95	1127.2863	0.0000	0.00
123.90	54.87	1128.9225	1.6362	0.00
143.10	58.79	1130.3528	1.4303	0.00
163.80	62.71	1131.6377	1.2849	0.00
185.46	66.63	1132.6954	1.0577	0.00
208.86	70.55	1133.7029	1.0075	0.00
233.16	74.47	1134.5428	.8399	0.00
258.96	78.39	1135.3198	.7770	0.00
286.26	82.31	1136.0405	.7207	0.00
314.76	86.23	1136.6810	.6405	0.00
344.46	90.15	1137.2563	.5753	0.00

130' W.D. MAX. 9B

H=0 Δ=3 VPCC=148 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=150 A2=500 A3=500 M=1

1150
250
900

920

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.63	10.97	1028.8328	1028.8328	0.00
5.53	14.89	1071.1490	42.3162	0.00
11.92	18.81	1088.1824	17.0334	0.00
19.78	22.73	1098.0721	9.8897	0.00
29.14	26.65	1104.7136	6.6415	0.00
39.97	30.57	1109.4726	4.7590	0.00
52.27	34.49	1113.0669	3.5943	0.00
66.07	38.41	1115.9045	2.8376	0.00
81.37	42.33	1118.2021	2.2976	0.00
98.17	46.25	1120.1005	1.8984	0.00
116.47	50.17	1121.6952	1.5947	0.00
116.47	50.17	1121.6952	0.0000	0.00
136.27	54.09	1123.0540	1.3588	0.00
157.33	58.01	1124.1796	1.1256	0.00
180.13	61.93	1125.2076	1.0280	0.00
204.43	65.85	1126.1107	.9031	0.00
229.93	69.77	1126.8766	.7659	0.00
257.23	73.69	1127.5928	.7162	0.00
285.73	77.61	1128.2106	.6178	0.00
316.03	81.53	1128.7940	.5834	0.00
347.53	85.45	1129.3035	.5095	0.00
380.53	89.37	1129.7684	.4649	0.00

140' W.D. NORMAL 10A

H=0 Δ=3 VPCC=132 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=140 A2=500 A3=500 M=1

1140
930

210

1100
210

890

10B

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.15	12.54	1009.7950	1009.7950	0.00
4.74	16.46	1068.4027	58.6077	0.00
10.59	20.38	1090.3911	21.9884	0.00
17.64	24.30	1103.1243	12.7332	0.00
25.95	28.22	1111.7972	8.6729	0.00
35.49	32.14	1118.0785	6.2813	0.00
46.29	36.06	1122.9013	4.8228	0.00
58.32	39.98	1126.6967	3.7954	0.00
71.58	43.90	1129.7680	3.0713	0.00
86.07	47.82	1132.3084	2.5404	0.00
101.82	51.74	1134.4602	2.1518	0.00
101.82	51.74	1134.4602	0.0000	0.00
118.92	55.66	1136.3387	1.8785	0.00
137.04	59.58	1137.8874	1.5487	0.00
156.54	63.50	1139.2826	1.3952	0.00
177.24	67.42	1140.5018	1.2192	0.00
199.14	71.34	1141.5780	1.0762	0.00
222.54	75.26	1142.5809	1.0029	0.00
246.84	79.18	1143.4315	.8506	0.00
272.64	83.10	1144.2347	.8032	0.00
299.64	87.02	1144.9581	.7234	0.00
327.54	90.94	1145.5874	.6293	0.00

140' W.D. MAX. 10B

H=0 Δ=3 VPCC=158 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=160 A2=500 A3=500 M=1

1160
250
910

930

11A

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.63	11.75	1029.3943	1029.3943	0.00
5.46	15.67	1073.8582	44.4639	0.00
11.67	19.59	1092.1266	18.2684	0.00
19.26	23.51	1102.9308	10.8042	0.00
28.26	27.43	1110.2683	7.3375	0.00
38.58	31.35	1115.4775	5.2092	0.00
50.31	35.27	1119.4892	4.0117	0.00
63.39	39.19	1122.6287	3.1395	0.00
77.88	43.11	1125.1938	2.5651	0.00
93.78	47.03	1127.3270	2.1332	0.00
111.00	50.95	1129.0968	1.7698	0.00
111.00	50.95	1129.0968	0.0000	0.00
129.60	54.87	1130.6094	1.5126	0.00
149.70	58.79	1131.9441	1.3347	0.00
171.00	62.71	1133.0699	1.1258	0.00
193.80	66.63	1134.0828	1.0129	0.00
218.10	70.55	1134.9972	.9144	0.00
243.60	74.47	1135.7889	.7917	0.00
270.60	78.39	1136.5125	.7236	0.00
298.80	82.31	1137.1508	.6383	0.00
328.50	86.23	1137.7403	.5895	0.00
359.40	90.15	1138.2653	.5250	0.00

150' W.D. NORMAL 11A

H=0 Δ=3 VPCC=142 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=150 A2=500 A3=500 M=1

1150
940
210

1106.5
210
896.5

1150
1090
60

1106.5
60
1046.5

11B

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.15	13.32	1009.9110	1009.9110	0.00
4.71	17.24	1070.7116	60.8006	0.00
10.41	21.16	1093.6801	22.9685	0.00
17.31	25.08	1107.5274	13.8473	0.00
25.35	29.00	1116.8256	9.2982	0.00
34.56	32.92	1123.6354	6.8098	0.00
44.94	36.84	1128.8611	5.2257	0.00
56.49	40.76	1133.0079	4.1468	0.00
69.18	44.68	1136.3588	3.3509	0.00
83.07	48.60	1139.1686	2.8098	0.00
98.10	52.52	1141.5249	2.3563	0.00
98.10	52.52	1141.5249	0.0000	0.00
114.30	56.44	1143.5449	2.0200	0.00
131.70	60.36	1145.3067	1.7618	0.00
150.30	64.28	1146.8554	1.5487	0.00
170.10	68.20	1148.2269	1.3715	0.00
190.80	72.12	1149.3873	1.1604	0.00
213.00	76.04	1150.4912	1.1039	0.00
236.10	79.96	1151.4396	.9484	0.00
260.40	83.88	1152.3061	.8665	0.00
286.20	87.80	1153.1337	.8276	0.00
312.90	91.72	1153.8570	.7233	0.00

150' W. D. MAX. 11B

H=0 Δ=3 YPCC=168 WW=0 W(1)=.0784 TOL=.1

W(3)=.0784 W(5)=.0784 A1=170 A2=500 A3=500 M=1

2

1170
250
920

940

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.39	5.48	826.8751	826.8751	0.00
4.80	8.66	852.3784	25.5032	0.00
11.19	11.83	860.5846	8.2062	0.00
19.59	15.01	864.9732	4.3886	0.00
29.85	18.18	867.6237	2.6505	0.00
42.18	21.36	869.5225	1.8988	0.00
56.58	24.53	870.9378	1.4152	0.00

60' W.D. 10' OF CHAIN ADDED

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.39	5.48	836.8751	836.8751	0.00
4.86	8.70	862.4847	25.6095	0.00
11.37	11.91	870.7165	8.2318	0.00
19.89	15.13	875.0366	4.3201	0.00
30.42	18.34	877.7391	2.7024	0.00
43.02	21.55	879.6267	1.8876	0.00
57.72	24.77	881.0257	1.3989	0.00

60' W.D. 20' OF CHAIN ADDED

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.63	11.75	1039.3943	1039.3943	0.00
5.52	15.71	1084.1570	44.7627	0.00
11.82	19.67	1102.4538	18.3018	0.00
19.50	23.63	1113.1606	10.7018	0.00
28.62	27.59	1120.4533	7.2927	0.00
39.12	31.55	1125.6845	5.2312	0.00

150' W.D. 10' OF CHAIN ADDED

THREE ELEMENT CATENARY

H	VBUOY	CHP	DX	V1
.63	11.75	1049.3943	1049.3943	0.00
5.58	15.75	1094.4516	45.0573	0.00
11.94	19.75	1112.6229	18.1713	0.00
19.77	23.75	1123.4794	10.8565	0.00
29.01	27.75	1130.6936	7.2142	0.00
39.69	31.75	1135.9256	5.2320	0.00

150' W.D. 20' OF CHAIN ADDED

COMPUTATION SHEET
ENGINEERING DEPARTMENT
McD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

INVESTIGATION TO DETERMINE
EXTENT OF SHIP FOULING WITH
ANCHOR LEGS.

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / EROL
SHEET NO: 4
SUBJECT: MONO - MOORING SYSTEM
DRAWING NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 3/23/65

VERTICAL PROJECTION FOR 60' W.D. = 60 - 2.5 = 57.5'

COMPUTER INPUT FOR 57.5' VPCC

H = 0 W(3) = .0784
DELTA = 3. W(5) = .0784
VPCC = 57.5' A1 = 90. FORMAT (6F8.2)
WW = 0.0 A2 = 300.
W(1) = .0784 A3 = 400.
TOL = .1

NOTE: USE CURVES ALREADY DRAWN FOR 60' & ADJUST CHP TO CHAIN LENGTH = 790'

INVESTIGATE POSSIBILITY OF SHIP'S HULL FOULING ANCHOR CHAINS.

PLOT CATENARY FOR 60 & 70 VPCC

HORIZONTAL @ PRELOAD 60' VPCC = 10.5^K

HORIZONTAL @ PRELOAD 70' VPCC ≈ 17.5^K

COMPUTER INPUT 60' VPCC
H = 10.5^K. W = .0784 VPCC = 60.

COMPUTER INPUT 70' VPCC
H = 17.5^K W = .0784 VPCC = 70.

SOME CONTACT OF SHIP WITH ANCHOR CHAINS WILL OCCUR.

```
PDQ FORTRAN C2
START
-6600      1 K=0
-6612        Y=0.0
-6624        X=0.0
-6636        WY=0.0
-6648        READ 2, H,W,VPCC
-6696      2 FORMAT (3F10.4)
-6728        C=H/W
-6764     10 IF(K-10)21,31,31
-6832     21 WY=WY+VPCC/10.
-6880        Y=C+WY
-6916        U=Y/C
-6952        X=LOG(U+(SQRT(U**2-1.0)))*C
-7048        K=K+1
-7084     40 PRINT 3, X,WY
-7120      3 FORMAT (10X,3HX =F10.4,5X,4HWY =F8.2)
-7190        GO TO 10
-7198     31 PAUSE
-7210        GO TO 1
-7218        END
 AD SUBROUTINES
PDQ FIXED FMT SUBROUTNS 11/63
PROCESSING COMPLETE
```

```
PDQ FORTRAN C2
START
PROCESSING COMPLETE
START


LOAD SUBROUTINES
PDQ FIXED FMT SUBROUTNS 11/63

        X =    55.7566      WY =     7.00
        X =    78.6494      WY =    14.00
        X =    96.0811      WY =    21.00
        X =   110.6664      WY =    28.00
        X =   123.4217      WY =    35.00
        X =   134.8696      WY =    42.00
        X =   145.3218      WY =    49.00
        X =   154.9820      WY =    56.00
        X =   163.9919      WY =    63.00
        X =   172.4553      WY =    70.00
```

H = 17.5 W = .0784 VPCC = 70.

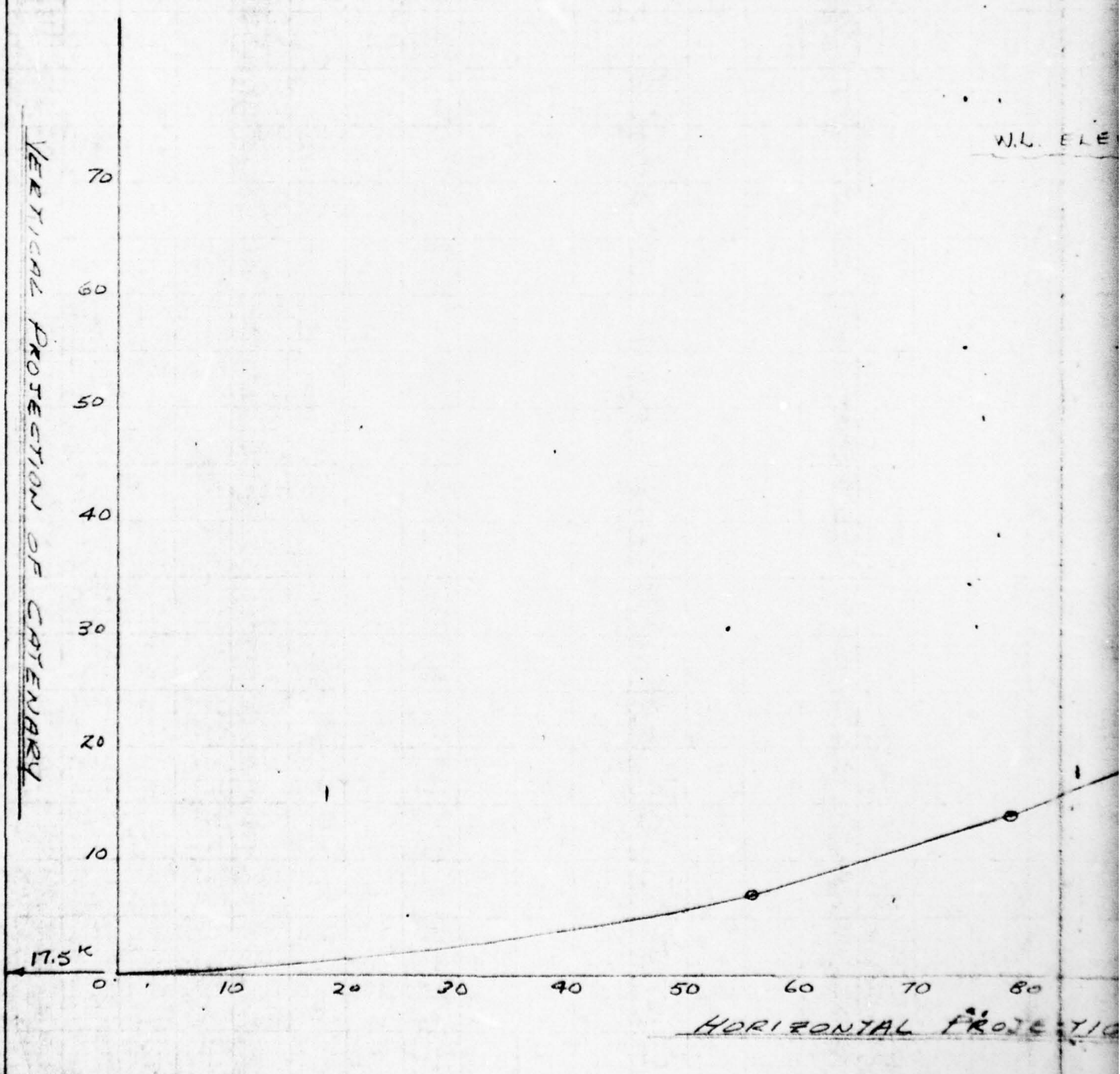
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

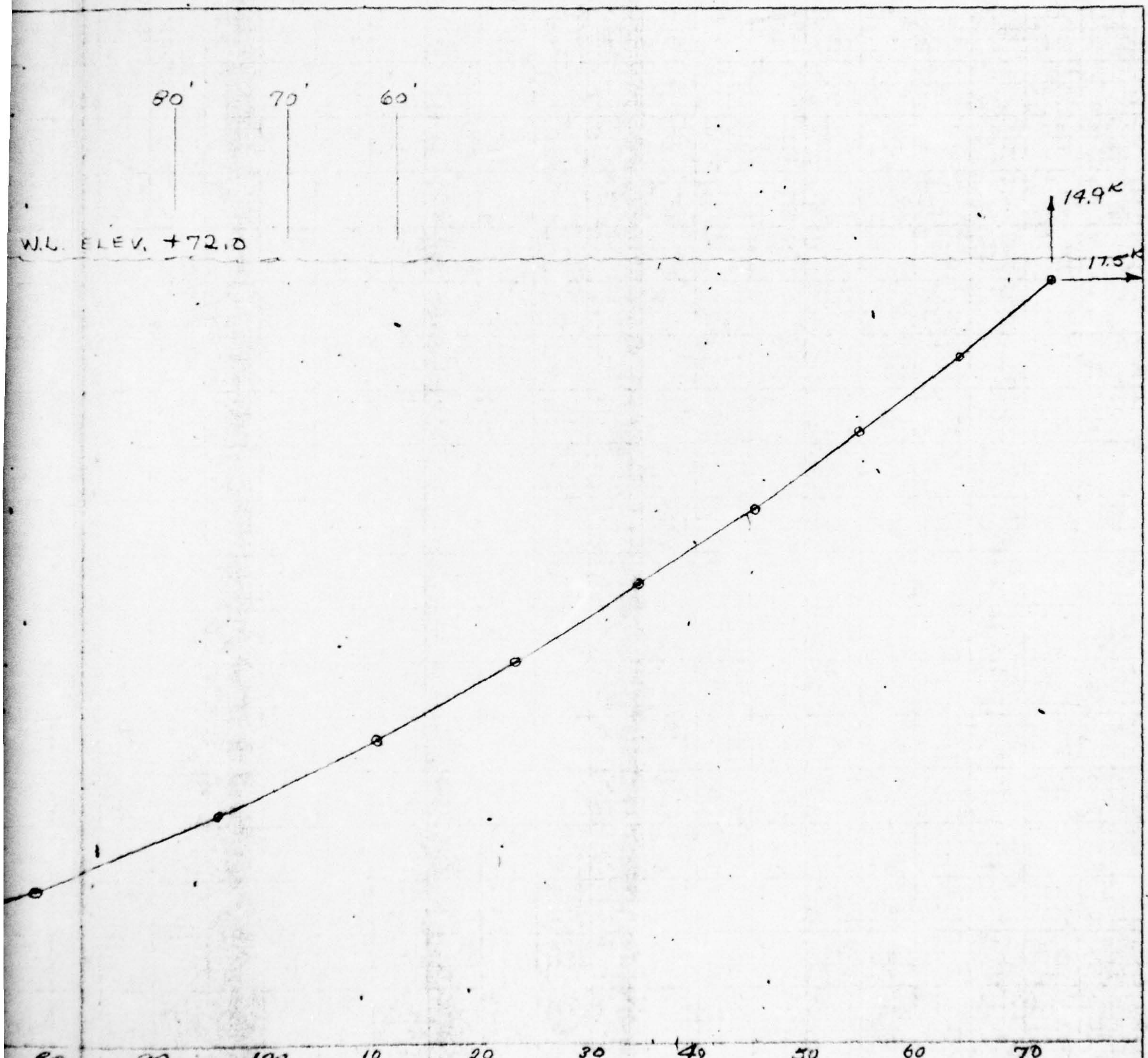
COMPANY: U.S. ARMY / ERDL
SHEET NO.: 5

SUBJECT: MONO - MOORING SYSTEM

NUMBER: JOB - 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 3/23/65



PLOT OF CATENARY FOR $H=17.5^k$ $W=.0789$ VPCC = 70.



ROJECTION OF CATENARY

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY U.S. ARMY / ERDL — SHEET NO. 6

SUBJECT MONO - MOORING SYSTEM

DRAWING NUMBER JOB 56017 — COMPUTER ANDREWS — CHECKED BY — DATE 3/27/65

INVESTIGATE 32' DIA. BUOY FOR MAX. W.D.

MSL = 150' TIDE 20' MAX. WAVE HT. 20'

WT. OF BUOY ≈ 100^T V_R FROM PRELOAD ≈ 230^K

10290

TRY 32' φ BUOY WITH 8½' φ WELL

.305
5%
.149

BUOYANCY/FT. = (.785(32)^2 − .785(8.5)^2) 64
= 748(64)
= 47.9^K/'

DRAFT FREE FLOATING = $\frac{200}{47.9}$ = 4.2'
DRAFT UNDER PRELOAD = $\frac{230}{47.9}$ = 4.8'
DRAFT DUE TO MOORING LOAD ≈ 2.0'

TOTAL DRAFT ≈ 11.0'

173.3
5.0
168.3

TRY BUOY HT. = 13' PLUS 2' TO TOP OF DECK

DISTANCE FROM BOTTOM OF BUOY TO CHAIN ATTACH. = 6.0'

VERTICAL PROJECTION OF CATENARY ≈ 150 + 10 + 13.3 − 5 = 168.3'

USE 168'

NOTE: CATENARY WILL BE SAME FOR 32' φ BUOY AS FOR 30' φ BUOY SEE (PG. 2 3/12/67)

TOTAL DRAFT UNDER MOORING LOAD $= \frac{491.5}{47.8} = \underline{10.3'}$

BUOY COULD BE MADE 32' ϕ IF NECESSARY.
THIS WILL BE INVESTIGATED FURTHER AFTER
EQUIPMENT LAYOUT & PRELIMINARY DESIGN OF
BUOY HULL, ROTATING DECK & MACHINERY.

2

COMPUTATION SHEET
ENGINEERING DEPARTMENT
McD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

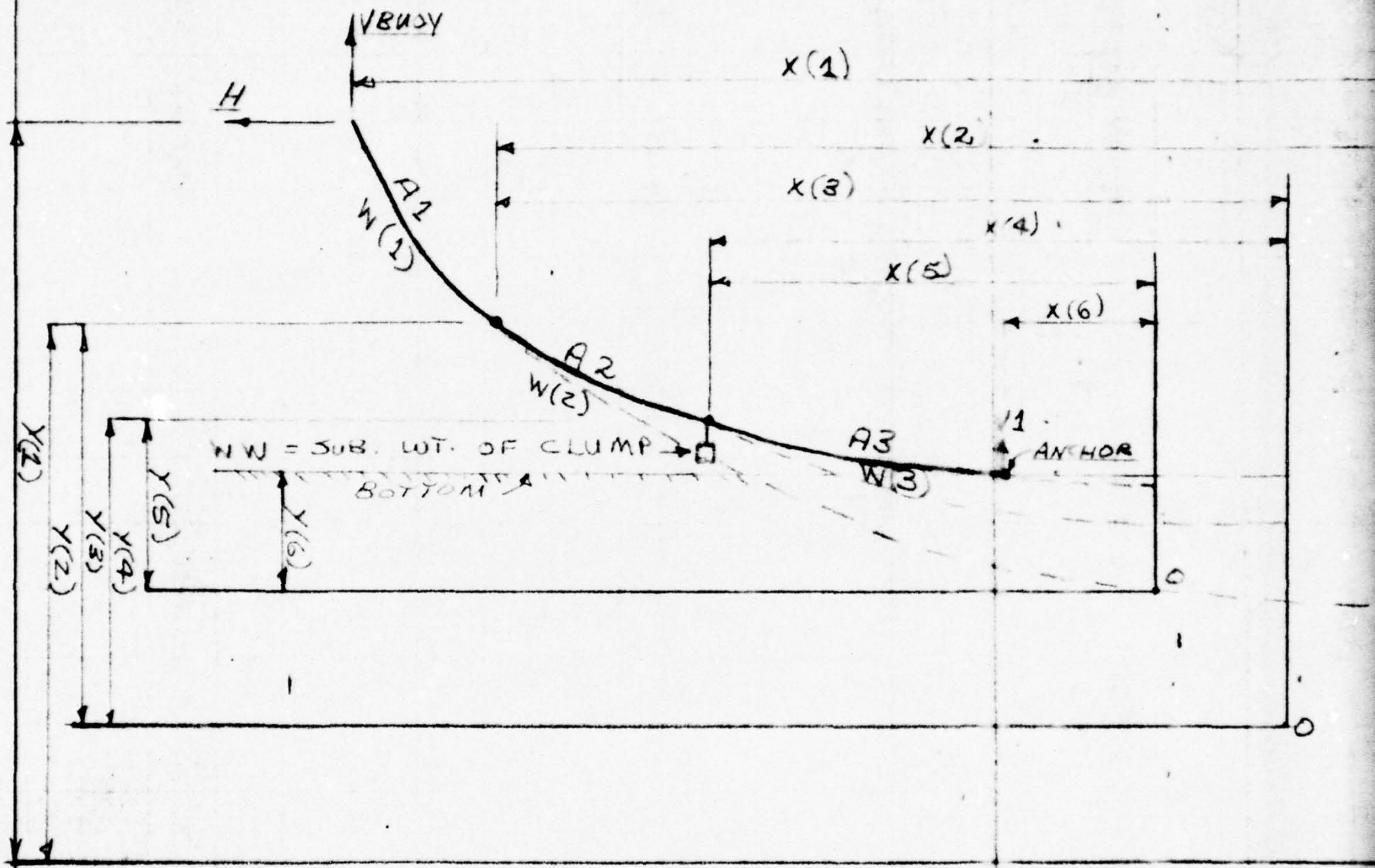
PRELIMINARY COMPUTER RESULTS AND CURVES FOR VARIOUS WATER DEPTHS AND VARIOUS COMBINATIONS OF CHAIN, SINKERS AND WIRE ROPE. FROM THIS DATA, THE DECISION TO GO WITH 3" ϕ CHAIN WITH NO WIRE ROPE OR SINKERS WAS MADE.

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO.
SUBJECT: USA ERDL — COMPOUND CATENARY	1

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		12/28/67



VPCC = WATER DEPTH (VERTICAL PROJECTION FROM H TO BOTTOM)

DELTA = INCREMENT TO VARY H

TOL = TOLERANCE FOR VPCC.

OUTPUT

T(1) = TENSION @ BUOY (TOP OF A1)
T(2) = TENSION @ BOTTOM OF A1
T(3) = TENSION @ TOP OF A2
T(4) = TENSION @ BOTTOM OF A2
T(5) = TENSION @ TOP OF A3
T(6) = TENSION @ BOTTOM OF A3 (AT ANCHOR)

X(1), X(2), X(3), X(4), X(5) & X(6) = HORIZONTAL PROJECTIONS AT CORRESPONDING "T" POINTS.

Y(1), Y(2), Y(3), Y(4), Y(5) & Y(6) = VERTICAL PROJECTION FROM ORIGIN TO CORRESPONDING "T" POINTS.

NOTE: IF SENSE 1 IS ON NONE OF ABOVE WILL BE PRINTED OUT.

H = HORIZONTAL COMPONENT TROUGHOUT CATENARY

VBUOY = VERTICAL COMPONENT OF CATENARY @ BUOY.

CHP = HORIZONTAL PROJECTION OF CATENARY FROM ANCHOR TO BUOY

DX = CHANGE IN HORIZONTAL PROJECTION (CHP).

V1 = VERTICAL COMPONENT OF CATENARY @ ANCHOR.

```
      DIMENSION C(6),S(6),T(6),U(6),W(6),X(6),Y(6)
    1 K=0
      CHPL=0.0
      A1L=0.0
      A2L=0.0
      B2L=0.0
      V1 =0.0
      N=1
      DO 2 I=1,6
      X(I)= 0.0
      Y(I)= 0.0
    2 S(I)= 0.0
      READ 3, H,DELTA,VPCC,WW,W(1),TOL
      READ 3, W(3),W(5),A1,A2,A3
    3 FORMAT (F8.2,F8.2,F8.2,F8.2,F8.2,F8.2)
      CON = DELTA
      W(2)= W(1)
      W(4)= W(3)
      W(6)= W(5)
    9 S(6)= V1/ W(6)
      S(5)= S(6)+ A1L
      S(4)= S(5)+ B2L
      S(3)= S(4)+ A2L
      S(2)= (S(3)*W(3))/ W(2)
      S(1)= S(2) + A1
   10 DO 4 I=1,6
      C(I)= H/ W(I)
    4 Y(I)= SQRT(S(I)**2 + C(I)**2)
      CVP = (Y(1)+Y(3)+Y(5)) - (Y(2)+Y(4)+Y(6))
        TEST= CVP-VPCC
      IF(CVP-VPCC)11,12,13
   11 IF(TEST+TOL)111,12,12
  111 H= H- CON
      CON= CON/ 10.0
      GO TO 10
   13 IF (TEST-TOL)12,12,113
  113 H= H+ CON
      GO TO 10
   12 CON= DELTA
      DO 5 I=1,6
      U(I)= Y(I)/ C(I)
      IF(U(I)-1.0)17,18,18
   17 U(I)= 1.0
   18 X(I)= LOG(U(I)+(SQRT(U(I)**2-1.0))) * C(I)
    5 T(I)= Y(I) * W(I)
      VBUOY=SQRT(T(1)**2-H**2)
      SUM= A2+A3-A1L-A2L
      CHP = (X(1)+X(3)+X(5)) - (X(2)+X(4)+X(6)) + SUM
      DX=CHP-CHPL
      IF(SENSE SWITCH 1)50,51
   51 PRINT 15
   15 FORMAT(10X,1HT,17X,1HX,17X,1HY)
```

```
      DO  6  I=1,6
    6 PRINT  7  , T(I),X(I),Y(I)
    7 FORMAT(E18.8,E18.8,E18.8)
   50 PRINT 8,H,VBUOY,CHP,DX,V1





    8 FORMAT (3X,3HH =F8.2,3X,7HVBUOY =F7.2,3X,5HCHP =F10.4,3X,
     14HDX =F8.4,3X,4HV1 =F6.2)
      CHPL=CHP
      PRINT 16
   16 FORMAT(1H /)
      GO TO (60,70,80,90),N
   60 IF(K-10)61,69,69
   61 A2L= A2L +(A2/ 10.0)
      K=K+1
      GO TO 9
   69 K=0
   70 IF(K-10)71,79,79
   71 B2L= B2L +(WW/ (W(4)*10.0))
      K=K+1
      N=2
      GO TO 9
   79 K=0
   80 IF(K-10)81,89,89
   81 A1L=A1L+(A3/10.0)
      K=K+1
      N=3
      GO TO 9
   89 K=0
   90 IF(K-10)91,99,99
   91 V1= V1 + (H/ 100.0)
      K=K+1
      N=4
      GO TO 9
   99 PAUSE
      GO TO 1
      END
```

H=0, DEPTH=3.0 VPCC=100 WW=10^4 W(1)=.0676 TOL=.1
W(2)=.0784 W(3)=.0789 A1=110 A2=300 A3=400

4

LOAD DATA

T	X	Y
.74693451E 01	.31821752E 02	.11049327E 03
.70499999E 00	.00000000E-50	.10428994E 02
.70500000E 00	.00000000E-50	.89923469E 01
.70500000E 00	.00000000E-50	.89923469E 01
.70500000E 00	.00000000E-50	.89923469E 01
.70500000E 00	.00000000E-50	.89923469E 01

H = .70 VBOUY = 7.43 CHP = 731.8217 DX = .73182175E 03 V1 = .00

T	X	Y
.10413595E 02	.91368048E 02	.15404727E 03
.42626199E 01	.32653794E 02	.63056508E 02
.42626200E 01	.28155568E 02	.54370153E 02
.35550000E 01	.00000000E-50	.45344388E 02
.35550000E 01	.00000000E-50	.45344388E 02
.35550000E 01	.00000000E-50	.45344388E 02

H = 3.55 VBOUY = 9.78 CHP = 756.8698 DX = 25.0480 V1 = .00

T	X	Y
.14076406E 02	.13731178E 03	.20823086E 03
.85377529E 01	.65322879E 02	.12629812E 03
.85377537E 01	.56324324E 02	.10889992E 03
.71250000E 01	.00000000E-50	.90880102E 02
.71250000E 01	.00000000E-50	.90880102E 02
.71250000E 01	.00000000E-50	.90880102E 02

H = 7.12 VBOUY = 12.13 CHP = 768.3132 DX = 11.4433 V1 = .00

H = 11.41 VBOUY = 14.49 CHP = 775.3588 DX = 7.0456 V1 = .00

H = 16.39 VBOUY = 16.84 CHP = 780.1734 DX = 4.8145 V1 = .00

H = 22.12 VBOUY = 19.19 CHP = 783.8351 DX = 3.6617 V1 = .00

H = 28.54 VBOUY = 21.54 CHP = 786.6379 DX = 2.8027 V1 = .00

H = 35.74 VBOUY = 23.90 CHP = 788.9558 DX = 2.3179 V1 = .00

H = 43.54 VBOUY = 26.25 CHP = 790.7566 DX = 1.8007 V1 = .00

H = 52.09 VBOUY = 28.60 CHP = 792.2991 DX = 1.5425 V1 = .00

H = 61.39 VBOUY = 30.95 CHP = 793.6309 DX = 1.3317 V1 = .00

H = 65.44 VBOUY = 31.95 CHP = 794.0876 DX = .4567 V1 = .00

(4-2)

H =	69.64	VBOUY =	32.95	CHP =	794.5303	DX =	.4427	V1 =	.00
H =	73.57	VBOUY =	33.95	CHP =	794.8063	DX =	.2760	V1 =	.00
H =	77.77	VBOUY =	34.95	CHP =	795.1384	DX =	.3320	V1 =	.00
H =	81.67	VBOUY =	35.95	CHP =	795.3267	DX =	.1882	V1 =	.00
H =	85.87	VBOUY =	36.95	CHP =	795.5847	DX =	.2580	V1 =	.00
H =	89.77	VBOUY =	37.95	CHP =	795.7207	DX =	.1359	V1 =	.00
H =	93.76	VBOUY =	38.95	CHP =	795.8683	DX =	.1476	V1 =	.00
H =	97.96	VBOUY =	39.95	CHP =	796.0519	DX =	.1835	V1 =	.00
H =	101.86	VBOUY =	40.95	CHP =	796.1422	DX =	.0902	V1 =	.00
H =	115.06	VBOUY =	44.09	CHP =	796.5682	DX =	.4260	V1 =	.00
H =	129.76	VBOUY =	47.22	CHP =	797.1567	DX =	.5885	V1 =	.00
H =	145.66	VBOUY =	50.36	CHP =	797.7630	DX =	.6063	V1 =	.00
H =	162.76	VBOUY =	53.50	CHP =	798.3628	DX =	.5998	V1 =	.00
H =	181.36	VBOUY =	56.63	CHP =	798.9724	DX =	.6096	V1 =	.00
H =	200.86	VBOUY =	59.77	CHP =	799.5148	DX =	.5424	V1 =	.00
H =	221.86	VBOUY =	62.90	CHP =	800.0460	DX =	.5312	V1 =	.00
H =	244.36	VBOUY =	66.04	CHP =	800.5602	DX =	.5142	V1 =	.00
H =	267.76	VBOUY =	69.18	CHP =	801.0076	DX =	.4474	V1 =	.00
H =	292.66	VBOUY =	72.31	CHP =	801.4426	DX =	.4350	V1 =	.00

4-3

H =	316.66	VBOUY =	75.24	CHP =	801.7947	DX =	.3521	V1 =	2.92
H =	341.86	VBOUY =	78.40	CHP =	802.0745	DX =	.2798	V1 =	6.09
H =	369.46	VBOUY =	81.82	CHP =	802.3244	DX =	.2499	V1 =	9.51
H =	399.46	VBOUY =	85.52	CHP =	802.5380	DX =	.2136	V1 =	13.20

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

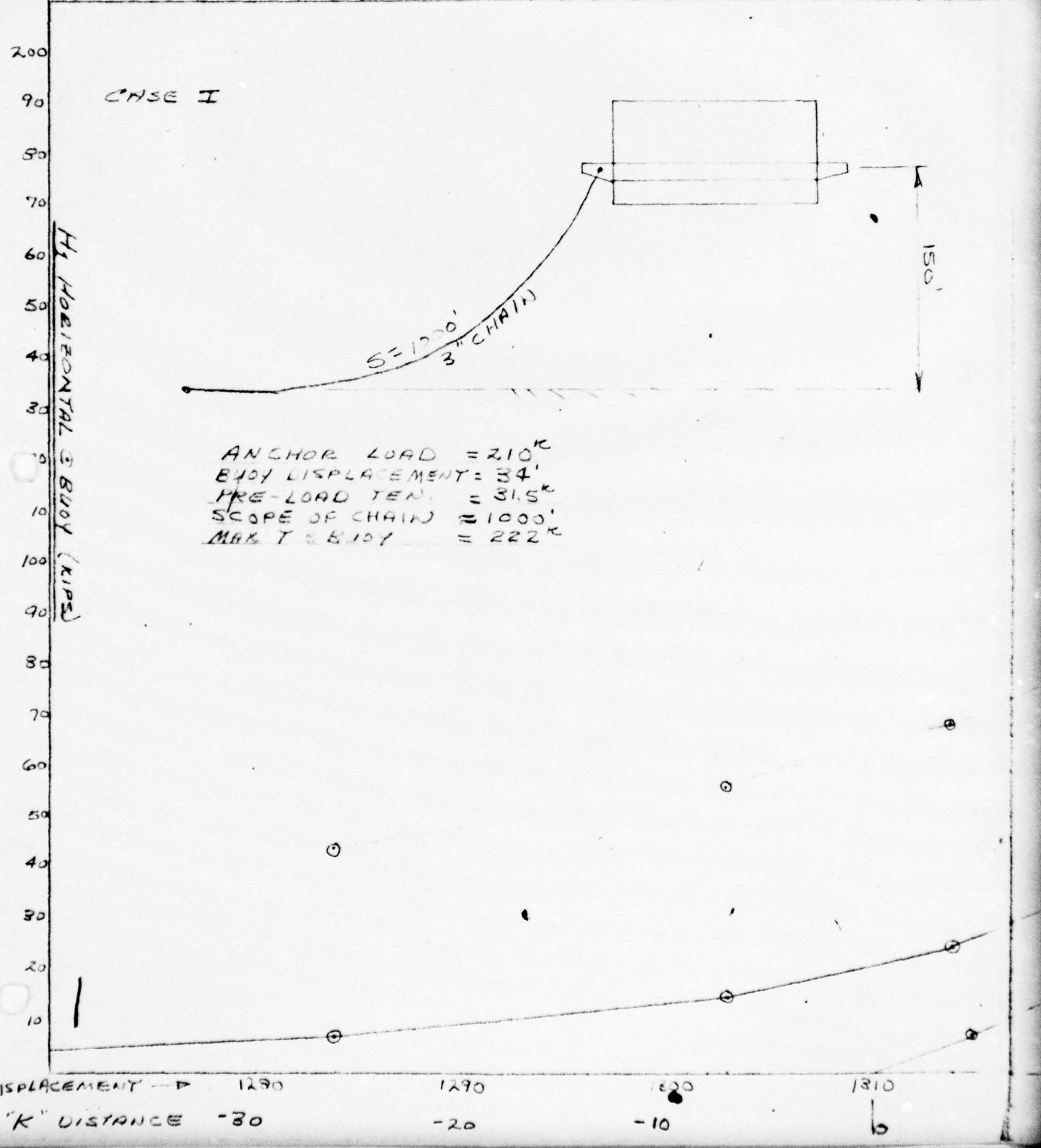
J. RAY McDERMOTT & CO., INC.

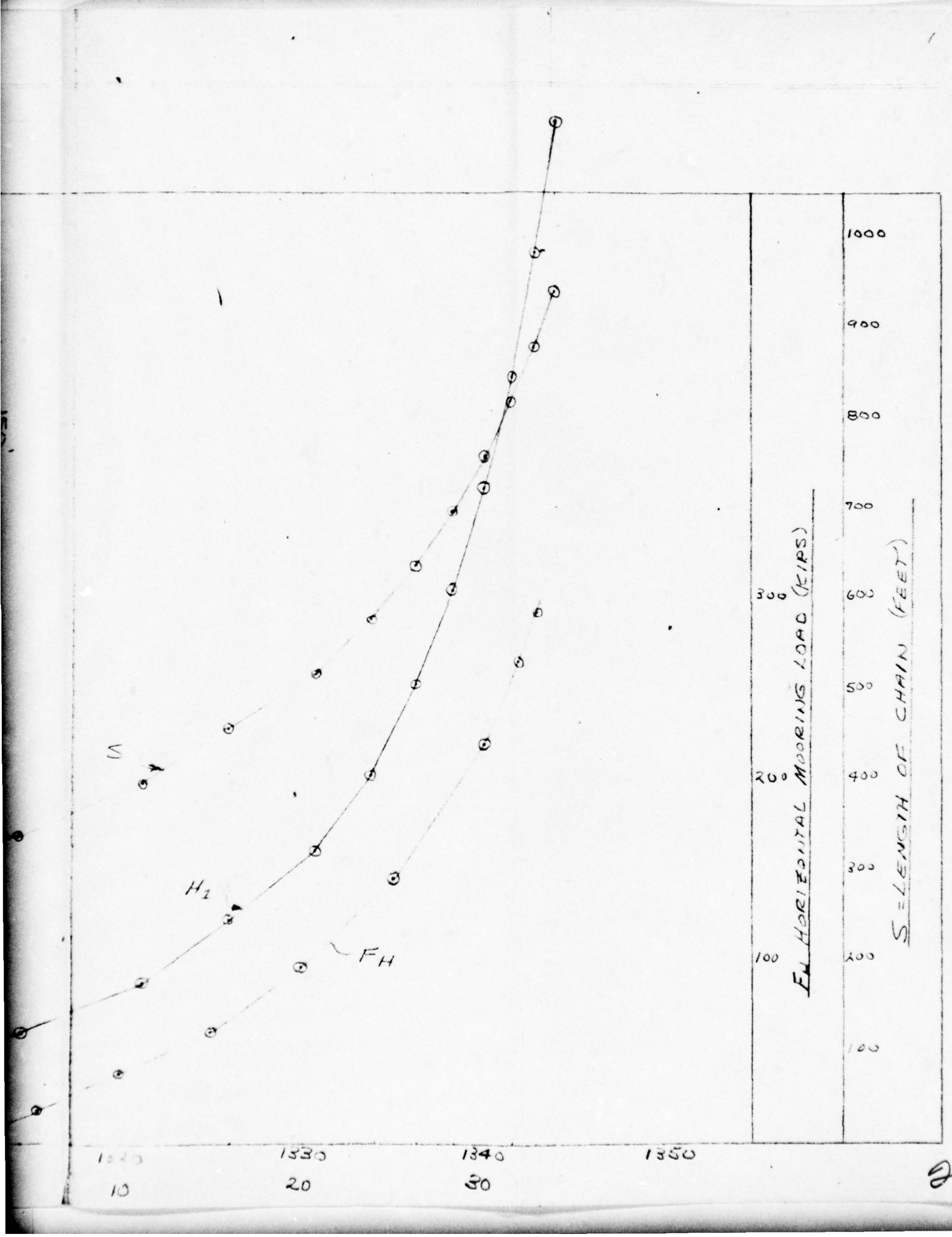
COMPANY | SHEET NO.

SUBJECT: US ARMY ERDL

MONO-MOORING SYSTEM

DRAWING NUMBER: JOB 56017 | COMPUTER: ANDREWS | CHECKED BY | DATE




E_H HORIZONTAL MOORING LOAD (KIPS)
S = LENGTH OF CHAIN (FEET)
100
200
300
100
200
300
400
500
600
700
800
900
1000
S
H1
FH
1330
1340
1350
10
20
30

LOAD DATA

H = .81	VBUOY = 12.54	CHP = 1235.4804	DX = .12354804E 04	V1 = .
H = 6.78	VBUOY = 17.24	CHP = 1283.8529	DX = 48.3725	V1 = .00
H = 14.61	VBUOY = 21.95	CHP = 1302.9082	DX = 19.0553	V1 = .00
H = 24.33	VBUOY = 26.65	CHP = 1314.0036	DX = 11.0954	V1 = .00
H = 35.91	VBUOY = 31.36	CHP = 1321.3373	DX = 7.3337	V1 = .00
H = 49.41	VBUOY = 36.06	CHP = 1326.6551	DX = 5.3178	V1 = .00
H = 64.74	VBUOY = 40.76	CHP = 1330.6210	DX = 3.9659	V1 = .00
H = 81.99	VBUOY = 45.47	CHP = 1333.7573	DX = 3.1363	V1 = .00
H = 101.19	VBUOY = 50.17	CHP = 1336.3105	DX = 2.5532	V1 = .00
H = 122.19	VBUOY = 54.87	CHP = 1338.3758	DX = 2.0653	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = 1.7113	V1 = .00

600' 750'

H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00

2 150' W.D.

H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 144.99	VBUOY = 59.58	CHP = 1340.0871	DX = .0000	V1 = .00
H = 169.89	VBUOY = 64.28	CHP = 1341.5926	DX = 1.5055	V1 = .00
H = 196.59	VBUOY = 68.99	CHP = 1342.8691	DX = 1.2765	V1 = .00
H = 225.09	VBUOY = 73.69	CHP = 1343.9674	DX = 1.0983	V1 = .00

230'

H = 255.39	VBUOY = 78.39	CHP = 1344.9242	DX = .9568	V1 = .00
H = 287.79	VBUOY = 83.10	CHP = 1345.7949	DX = .8707	V1 = .00
H = 321.99	VBUOY = 87.80	CHP = 1346.5629	DX = .7680	V1 = .00

T	X	Y
.36975033E 03	.11672459E 04	.47162032E 04
.36681293E 03	.10117016E 04	.46787363E 04
.36681293E 03	.10117016E 04	.46787363E 04
.35950117E 03	.41940588E 03	.45854741E 04
.35950117E 03	.41940588E 03	.45854741E 04
.35799000E 03	.00000000E-50	.45661990E 04

H = 357.99	VBUOY = 92.51	CHP = 1347.2459	DX = .6830	V1 = .00
H = 395.79	VBUOY = 97.21	CHP = 1347.8578	DX = .6119	V1 = .00
H = 435.69	VBUOY = 101.91	CHP = 1348.4237	DX = .5659	V1 = .00
H = 477.69	VBUOY = 106.62	CHP = 1348.9528	DX = .5291	V1 = .00
H = 520.59	VBUOY = 111.40	CHP = 1349.4441	DX = .4913	V1 = 4.77

BUOY HEEL ∡S FOR 150' W.D. 3" CHAIN

30' DIA. BUOY

LOAD DATA

B = 460.0000	DEG = 7.347197	FV = 0
B = 410.0000	DEG = 4.085060	= 50
B = 360.0000	DEG = 1.092838	= 100
B = 310.0000	DEG = -1.647242	= 150

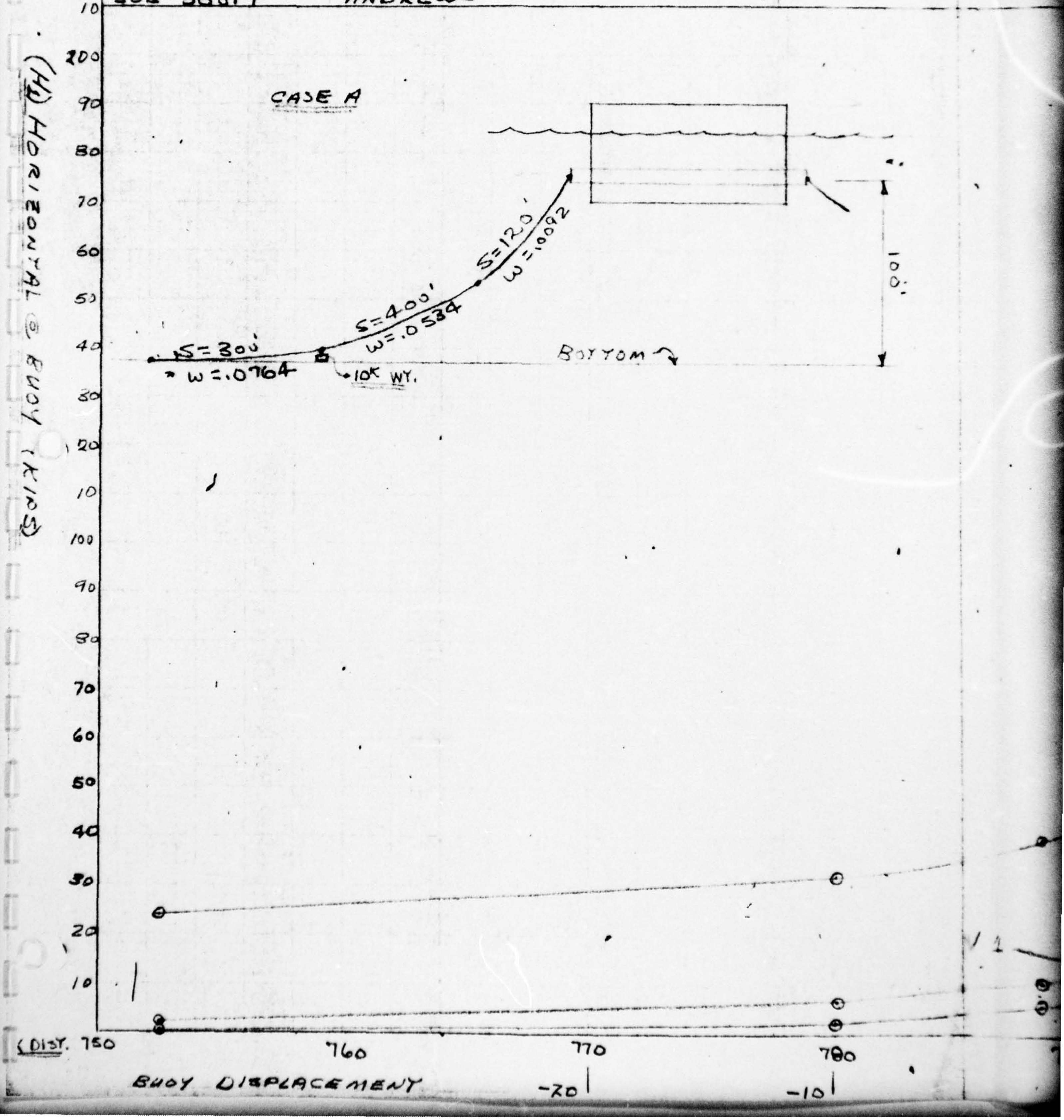
$R_1 = 15$	$F_H = 300$	F_V = (SEE ABOVE)
$R2 = 17$	$H_1 = 210$	$V_1 = 71.0$
$R3 = 12$	$H_2 = 56.5$	$V_2 = 45.0$
$W = 200$	$H_3 = 6.0$	$V_3 = 17.0$
$C = 10$	$H4 = 8.5$	$V_4 = 18.0$
$D = 14$		$V_5 = 23$
$E = 20$		$WL = .064$
$BK = 9$		

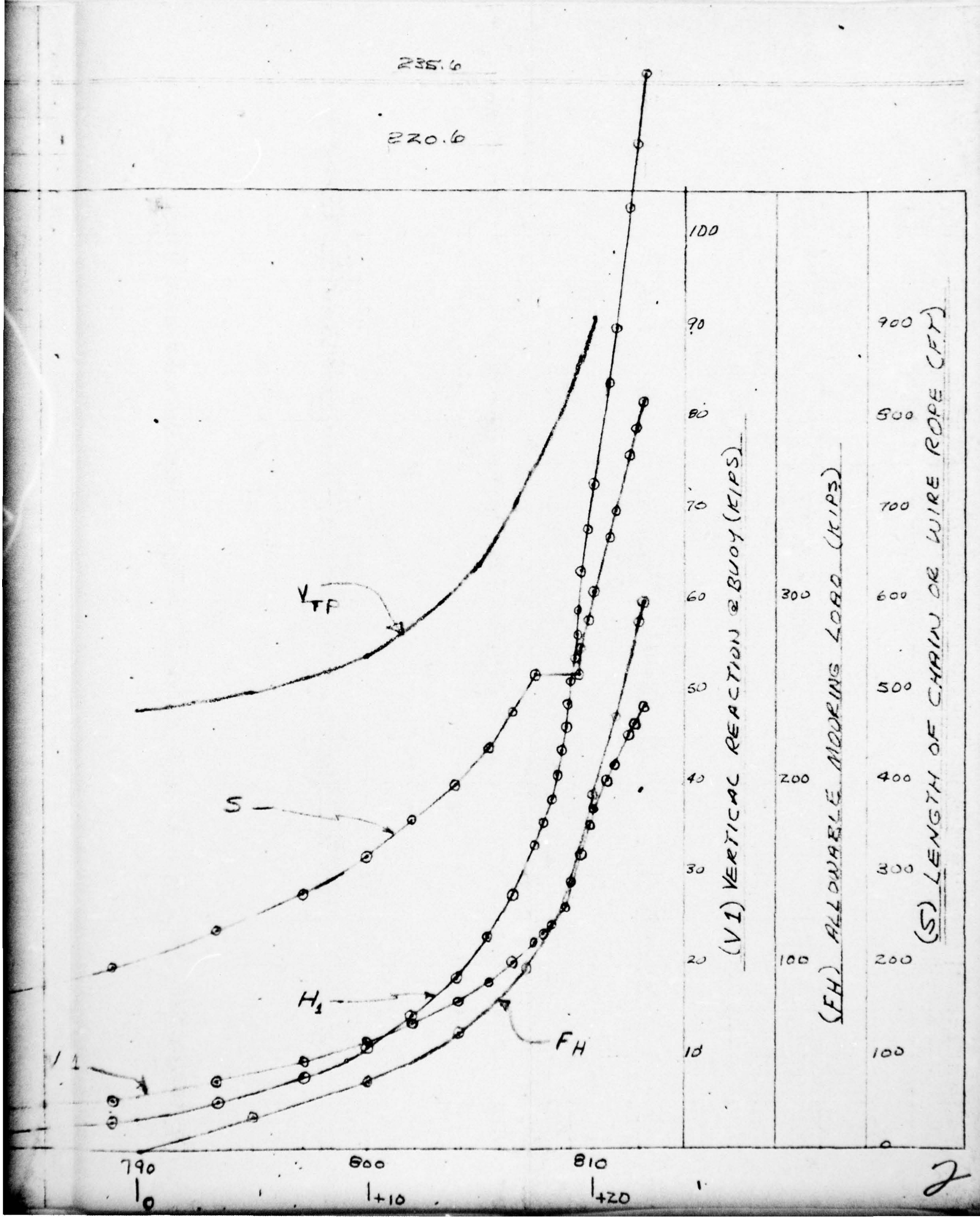
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
USA ERDL	1
SUBJECT	
MONO- MOORING	

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		





235.6
220.6
V_{TP}
S
H_1
V1
F_H
100
90
80
70
60
50
40
30
20
10
(V1) VERTICAL REACTION @ BUOY (KIPS)
300
200
100
(FH) ALLOWABLE MOORING LOAD (KIPS)
900
800
700
600
500
400
300
200
100
0
(S) LENGTH OF CHAIN OR WIRE ROPE (FT)
790
800
810
0
+10
+20

2

H = 0.0 DELTA = 3.0 WW = 10^{12} W(1) = .0092 TOL = 0.1 CASE A
W(2) = .0539; W(3) = .0764 A1 = 120 A2 = 400 A3 = 300

LOAD DATA

H =	.20	VBOUY =	1.10	CHP =	752.5842	DX =	.75258429E 03	V1 =	
H =	2.60	VBOUY =	3.23	CHP =	780.1042	DX =	27.5199	V1 =	.00
H =	6.05	VBOUY =	5.37	CHP =	788.3591	DX =	8.2549	V1 =	.00
H =	10.49	VBOUY =	7.51	CHP =	793.5624	DX =	5.2032	V1 =	.00
H =	15.86	VBOUY =	9.64	CHP =	797.2198	DX =	3.6573	V1 =	.00
H =	22.16	VBOUY =	11.78	CHP =	800.0045	DX =	2.7847	V1 =	.00
H =	29.27	VBOUY =	13.92	CHP =	802.0794	DX =	2.0749	V1 =	.00
H =	37.37	VBOUY =	16.05	CHP =	803.8602	DX =	1.7808	V1 =	.00
H =	46.22	VBOUY =	18.19	CHP =	805.2371	DX =	1.3769	V1 =	.00
H =	55.97	VBOUY =	20.32	CHP =	806.4182	DX =	1.1811	V1 =	.00
H =	66.59	VBOUY =	22.46	CHP =	807.4266	DX =	1.0084	V1 =	.00
H =	71.78	VBOUY =	23.46	CHP =	807.8319	DX =	.4053	V1 =	.00
H =	76.94	VBOUY =	24.46	CHP =	808.1458	DX =	.3139	V1 =	.00
H =	82.07	VBOUY =	25.46	CHP =	808.3949	DX =	.2491	V1 =	.00
H =	87.23	VBOUY =	26.46	CHP =	808.6139	DX =	.2190	V1 =	.00
H =	92.36	VBOUY =	27.46	CHP =	808.7910	DX =	.1771	V1 =	.00
H =	97.52	VBOUY =	28.46	CHP =	808.9459	DX =	.1549	V1 =	.00
H =	102.65	VBOUY =	29.46	CHP =	809.0737	DX =	.1278	V1 =	.00
H =	107.78	VBOUY =	30.46	CHP =	809.1918	DX =	.1181	V1 =	.00
H =	112.91	VBOUY =	31.46	CHP =	809.2884	DX =	.0966	V1 =	.00

H = 118.04	VBOUY = 32.46	CHP = 809.3693	DX = .0809	V1 = .00
H = 126.74	VBOUY = 34.06	CHP = 809.5430	DX = .1737	V1 = .00
H = 136.04	VBOUY = 35.66	CHP = 809.7934	DX = .2504	V1 = .00
H = 145.94	VBOUY = 37.27	CHP = 810.0713	DX = .2779	V1 = .00
H = 156.74	VBOUY = 38.87	CHP = 810.3833	DX = .3120	V1 = .00
H = 168.14	VBOUY = 40.47	CHP = 810.7054	DX = .3221	V1 = .00
H = 180.14	VBOUY = 42.07	CHP = 811.0185	DX = .3131	V1 = .00
H = 193.04	VBOUY = 43.67	CHP = 811.3432	DX = .3247	V1 = .00
H = 206.54	VBOUY = 45.28	CHP = 811.6491	DX = .3059	V1 = .00
H = 220.64	VBOUY = 46.88	CHP = 811.9471	DX = .2980	V1 = .00
H = 235.64	VBOUY = 48.48	CHP = 812.2368	DX = .2897	V1 = .00
H = 251.24	VBOUY = 50.13	CHP = 812.4800	DX = .2432	V1 = 2.35
H = 267.74	VBOUY = 51.88	CHP = 812.7048	DX = .2248	V1 = 4.86
H = 285.74	VBOUY = 53.75	CHP = 812.9153	DX = .2105	V1 = 7.54
H = 304.34	VBOUY = 55.75	CHP = 813.0431	DX = .1278	V1 = 10.40
H = 324.44	VBOUY = 57.88	CHP = 813.2035	DX = .1604	V1 = 13.44
H = 346.04	VBOUY = 60.15	CHP = 813.3137	DX = .1102	V1 = 16.69
H = 368.84	VBOUY = 62.56	CHP = 813.4090	DX = .0953	V1 = 20.15
H = 393.14	VBOUY = 65.14	CHP = 813.4953	DX = .0863	V1 = 23.84

4906600RS

16.5
6

71

142

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: USA ERDL

SHEET: 2

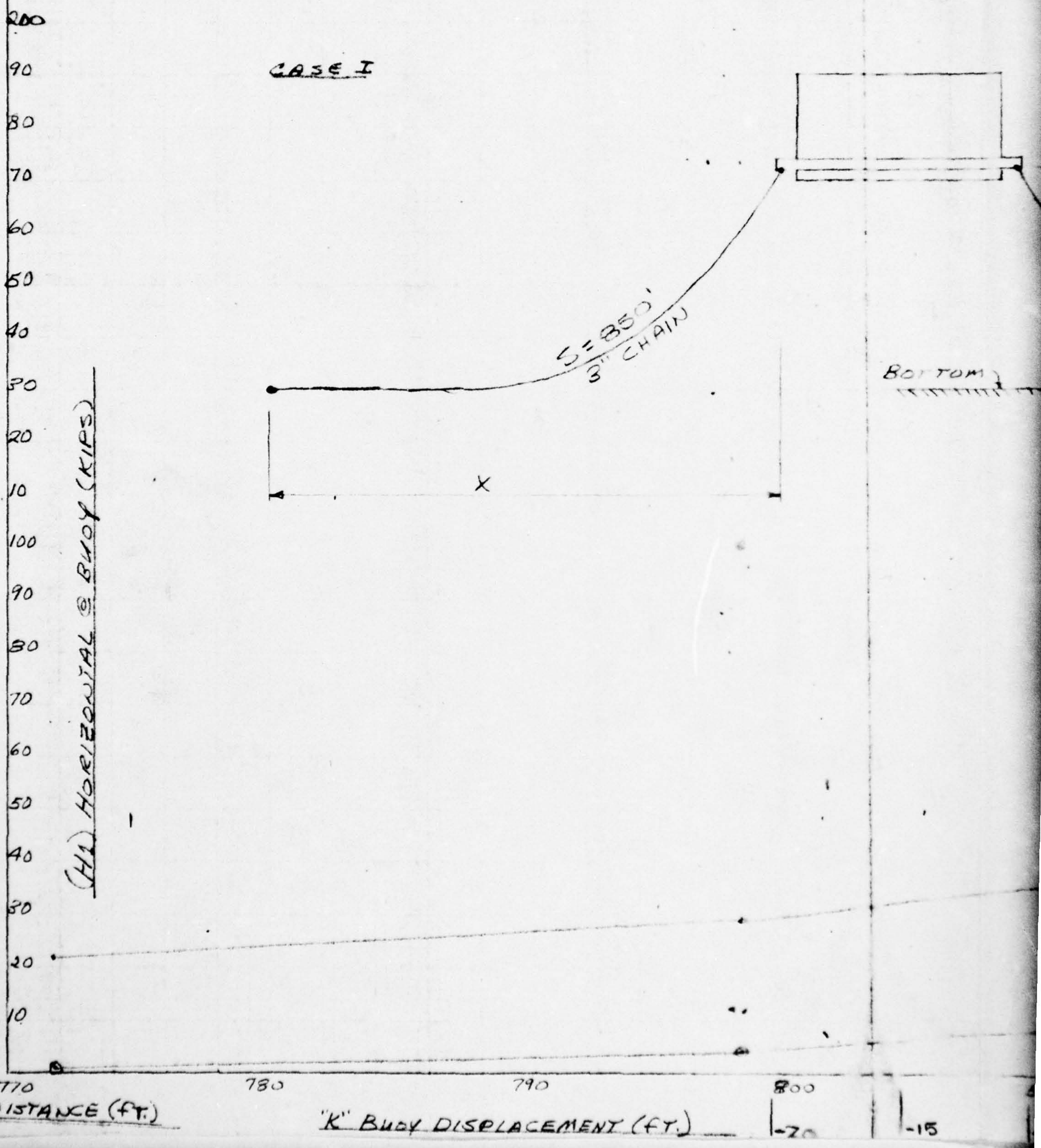
SUBJECT: MONO-MOORING SYSTEM

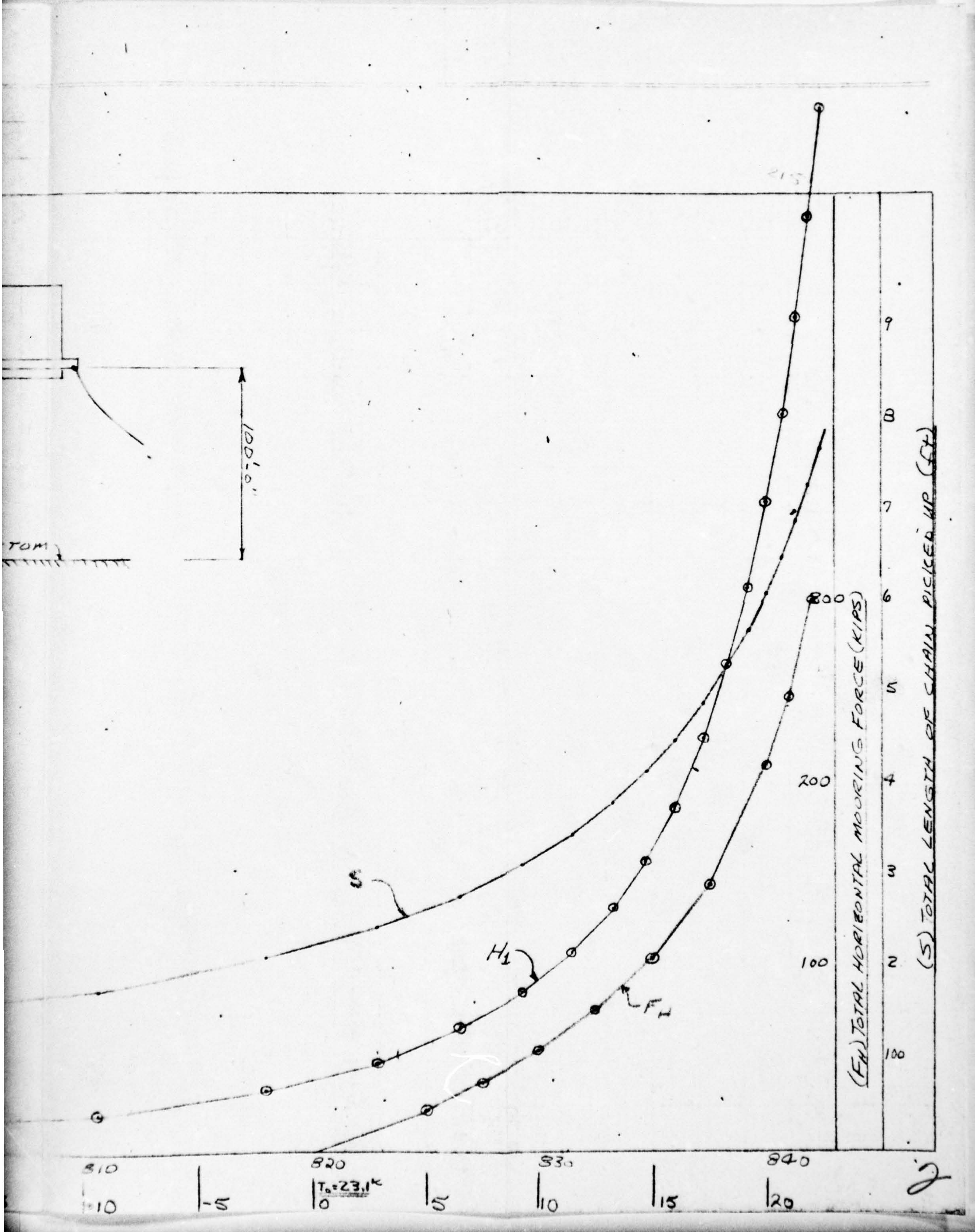
NUMBER: JOB 56017

COMPUTER: ANDREWS

CHECKED BY:

DATE: 12/22/64





S
H_1
F_H
100'-0"
TOM
100
200
300
(FH) TOTAL HORIZONTAL MOORING FORCE (KIPS)
2
3
4
5
6
7
8
9
100
(S) TOTAL LENGTH OF CHAIN PICKED UP (FT)
810
820
830
840
-10
-5
0
5
10
15
20
$T_0 = 23.1^k$

2

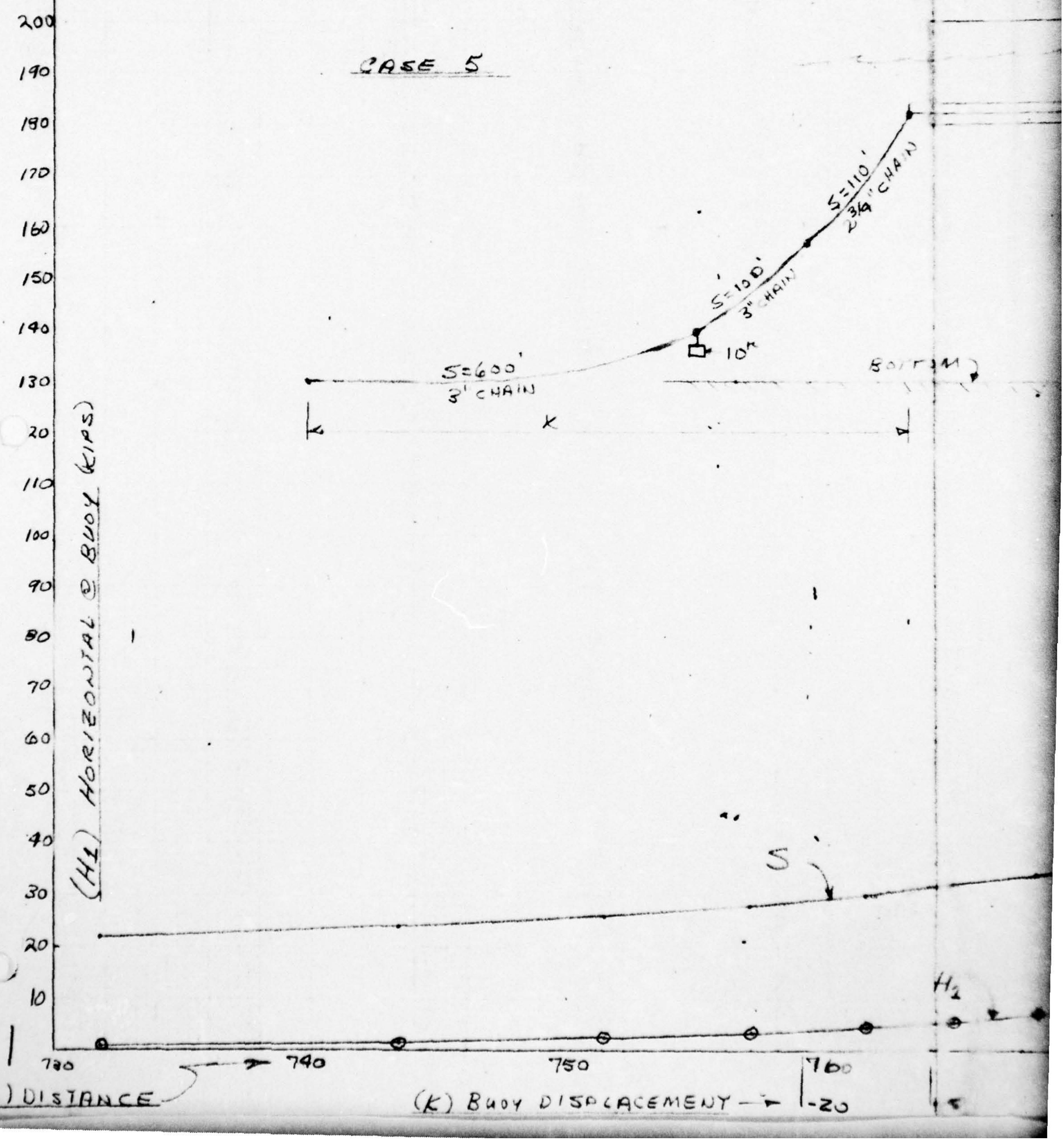
ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

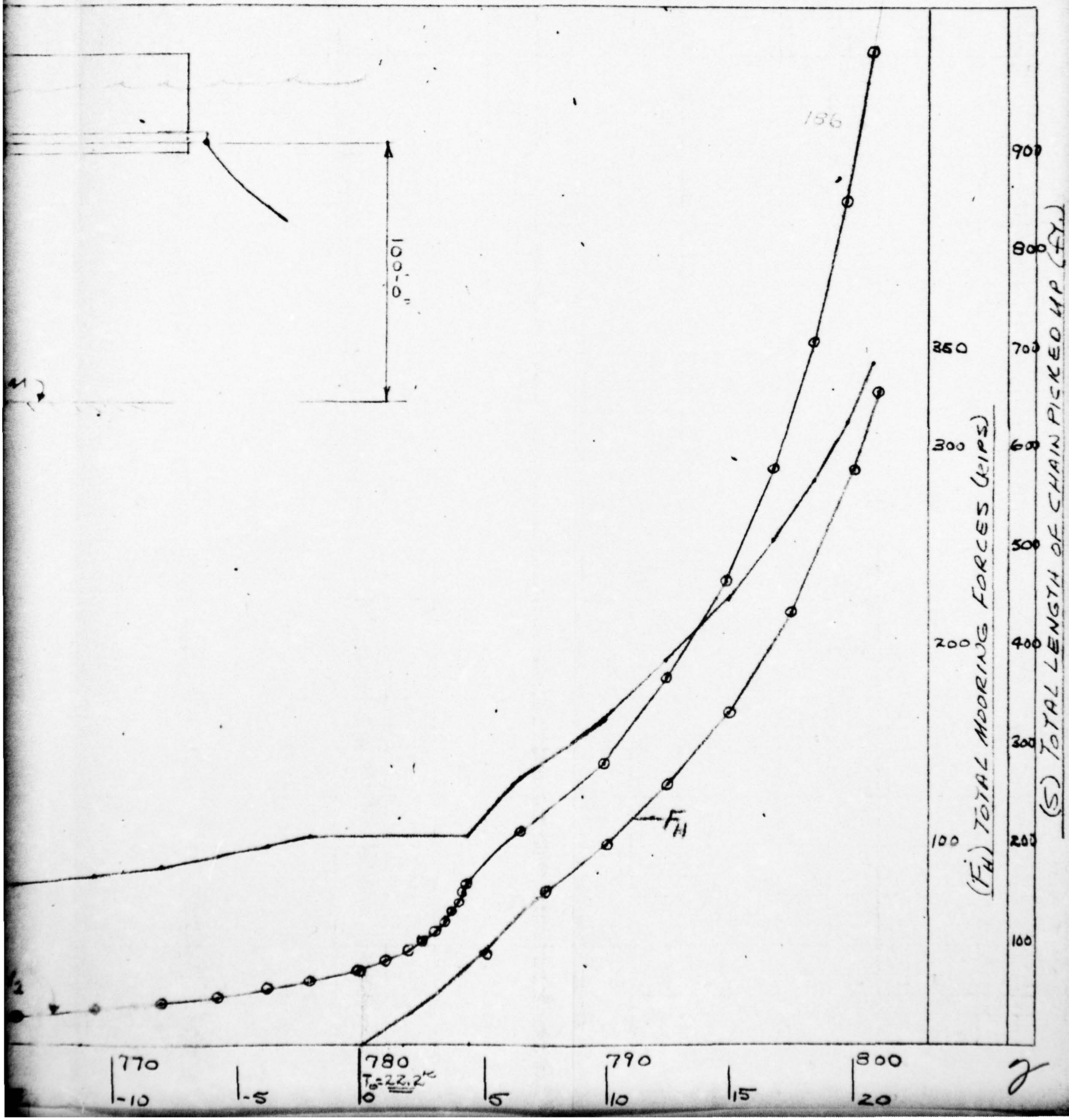
J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
USA ERDL	3

SUBJECT: MONO-MOORING SYSTEM

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		12/18/69





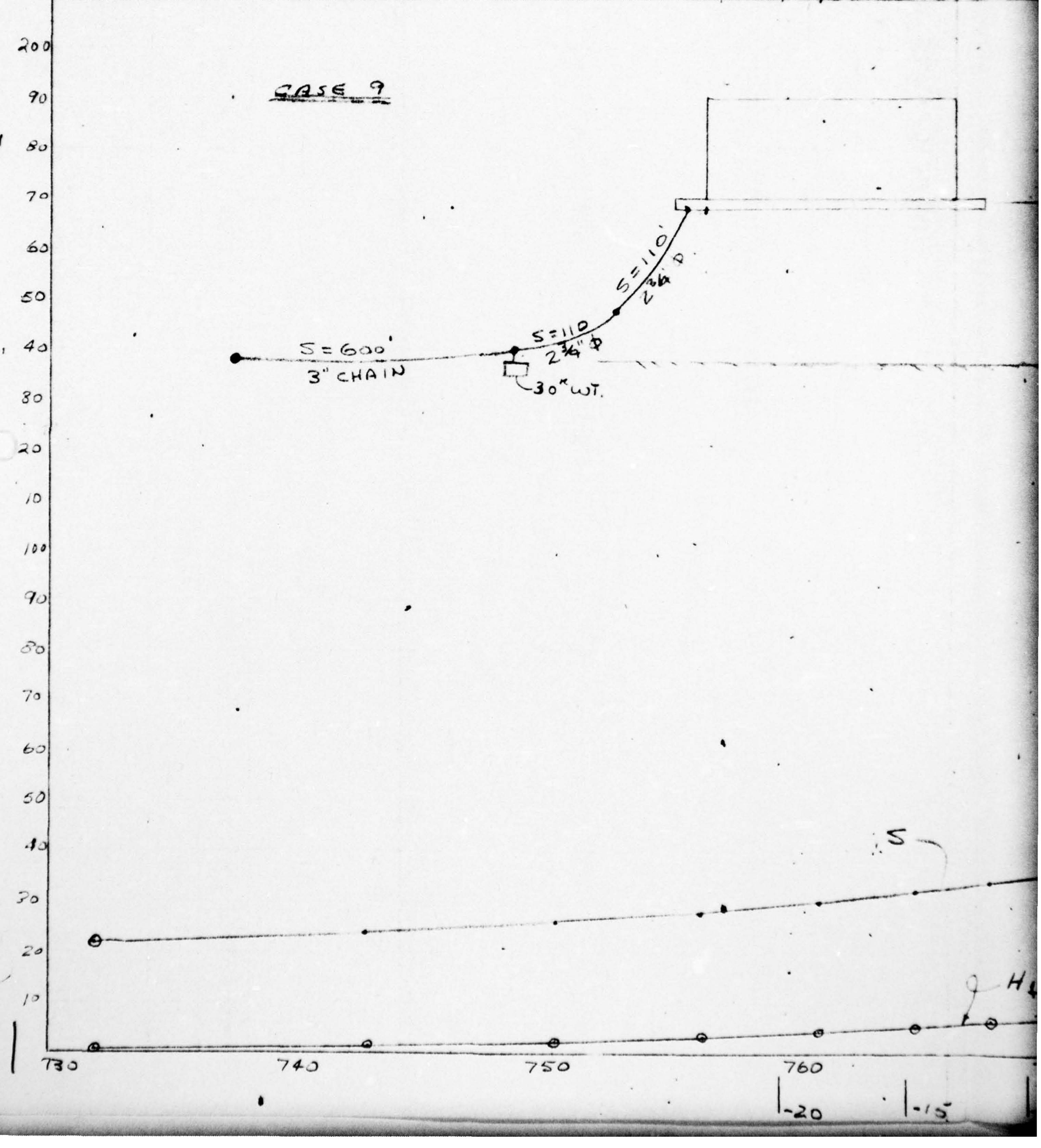
186
10'-0"
F_H
350
300
200
100
(F_H) TOTAL MOORING FORCES (KIPS)
900
800
700
600
500
400
300
200
100
(S) TOTAL LENGTH OF CHAIN PICKED UP (FT.)
770
780
790
800
-10
-5
0
5
10
15
20
T_0=22.2k

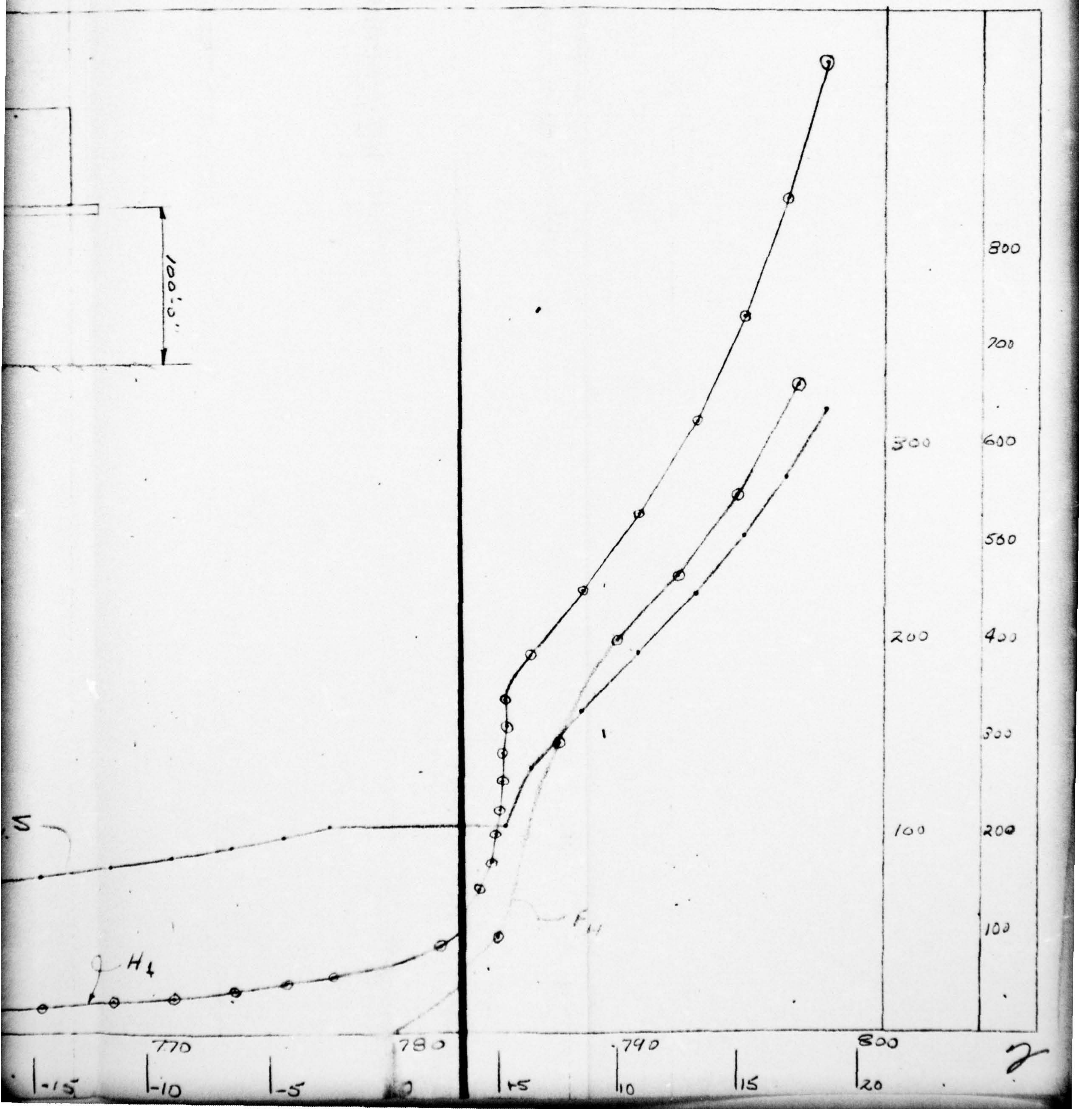
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY USA ERDL	SHEET NO 4
SUBJECT MONO-MOORING SYSTEM	

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB E6017	ANDREWS		12/21/69





ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: USA ERDL

SHEET NO: 5

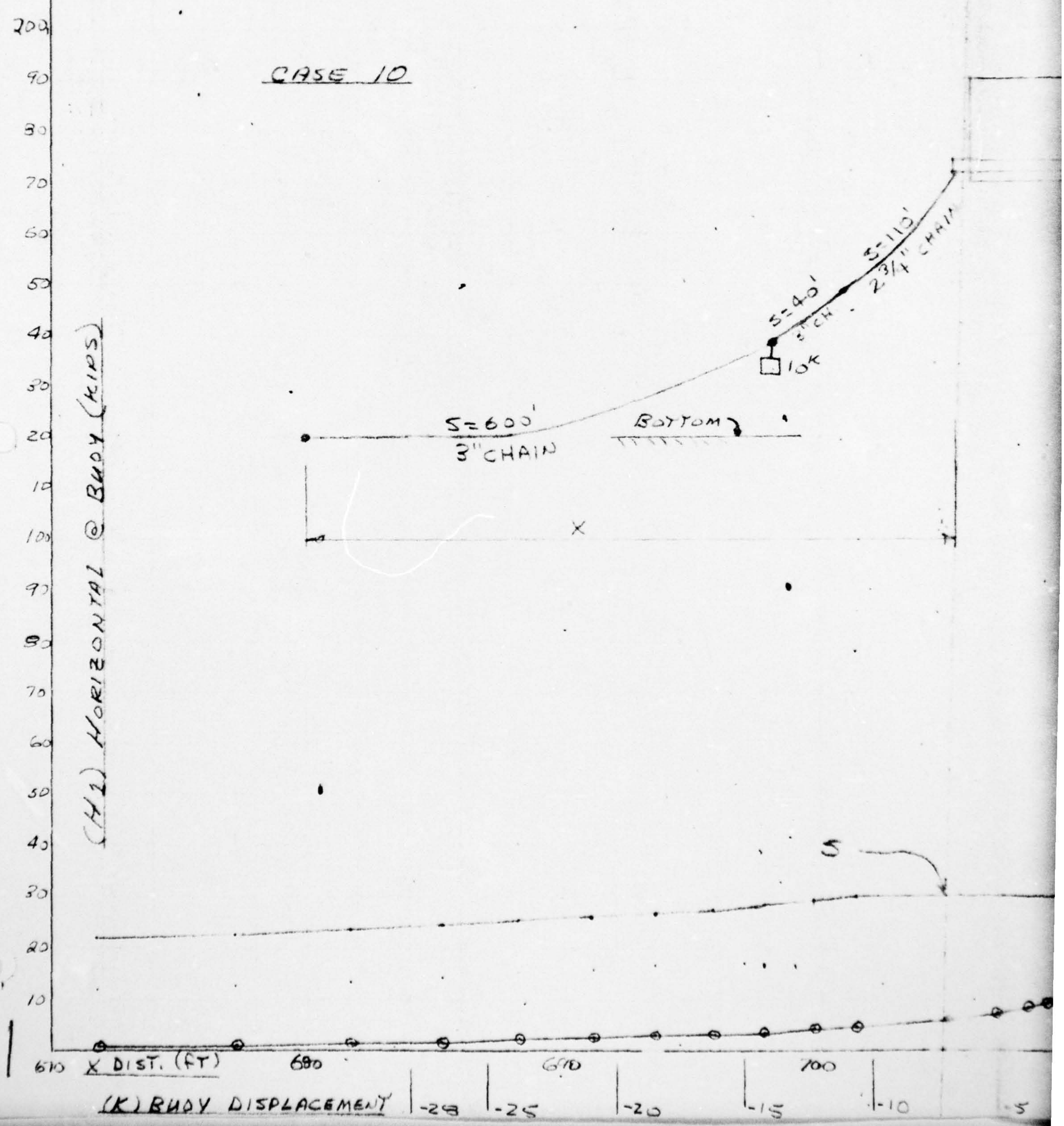
SUBJECT: MONO-MOORING SYSTEM

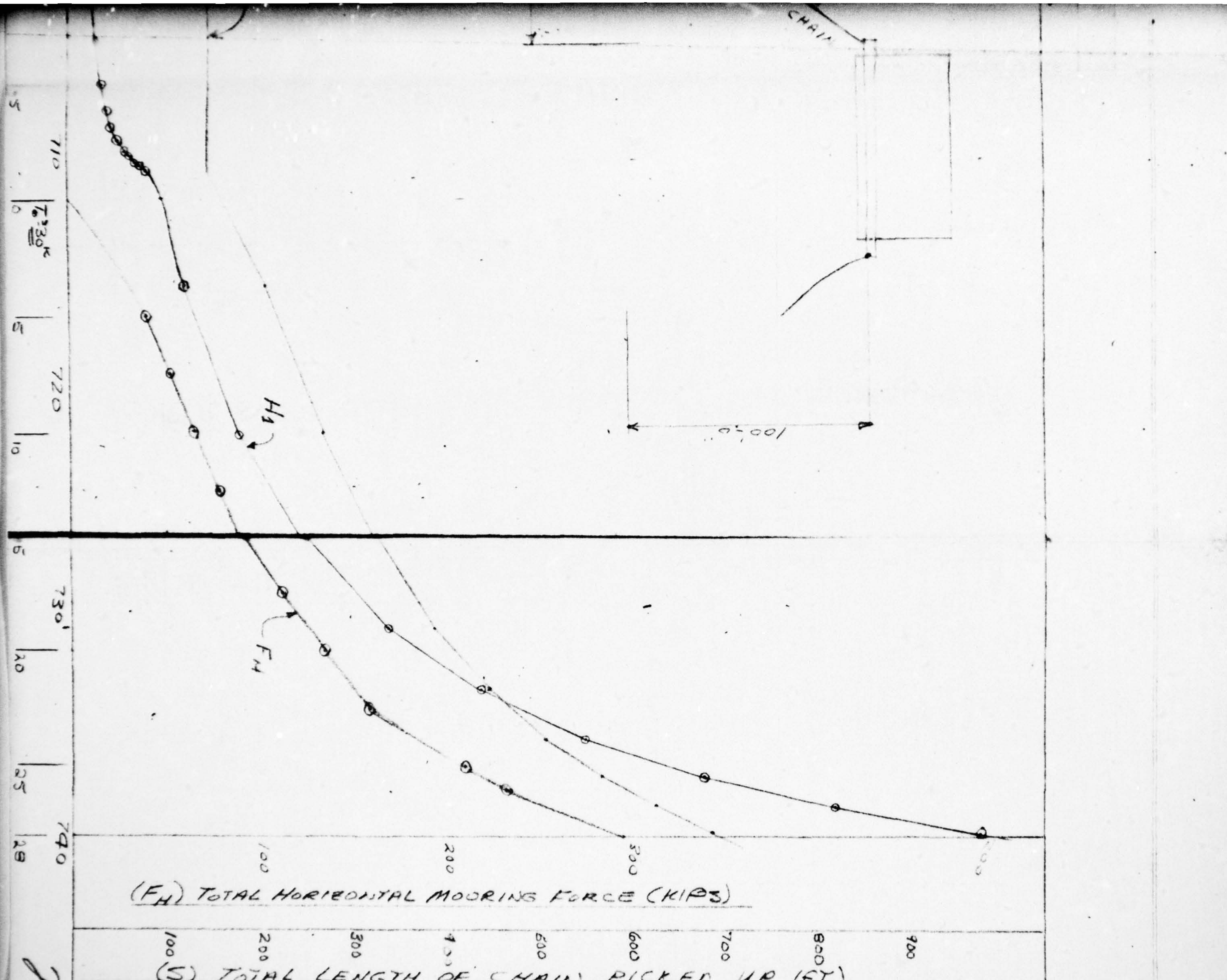
DRAWING NUMBER: JOB 56017

COMPUTER: ANDREWS

CHECKED BY:

DATE: 12/22/64





CHAIN
100'-0"
H1
FH
710
720
730'
740
To=30K
0
5
10
15
20
25
28
100
200
300
400
(FH) TOTAL HORIZONTAL MOORING FORCE (KIPS)
100
200
300
400
500
600
700
800
900
(S) TOTAL LENGTH OF CHAIN PICKED UP (FT)

AD-A034 242 MCDERMOTT (J RAY) CO INC NEW ORLEANS LA F/G 13/10

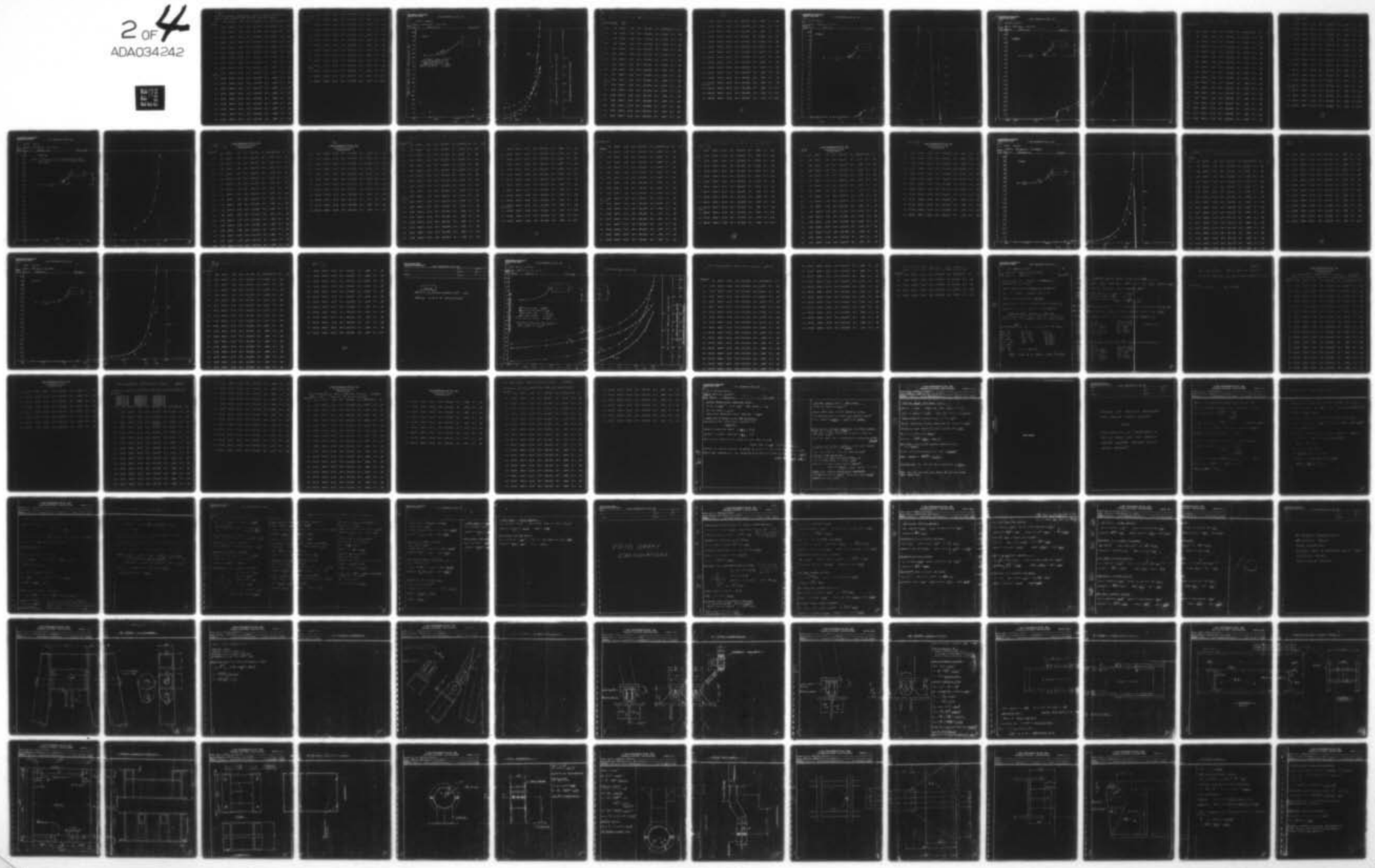
ENGINEERING DESIGN CALCULATIONS MONO-MOORING SYSTEM. VOLUME 1. --ETC(U)

1966 DA-44-009-AMC-841(T)

UNCLASSIFIED NL

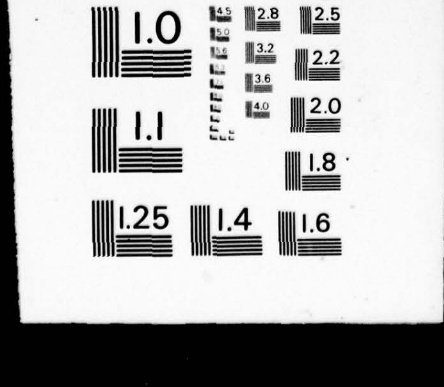
2 OF 4

ADA034242



2 OF 4

ADA034242



(1)

H=0 DELTA=3.0 VPCC=60. WN=0 W(1)=.0784 TOL=.1
W(3)=.0784 W(5)=.0784 A1=65 A2=300 A3=300

H =	.40	VBUOY =	5.09	CHP =	616.5848	DX =	.61658485E 03	V1 =	
H =	3.55	VBUOY =	7.44	CHP =	637.3306	DX =	20.7457	V1 =	.00
H =	7.84	VBUOY =	9.80	CHP =	644.7661	DX =	7.4354	V1 =	.00
H =	13.33	VBUOY =	12.15	CHP =	648.9969	DX =	4.2308	V1 =	.00
H =	19.99	VBUOY =	14.50	CHP =	651.7230	DX =	2.7261	V1 =	.00
H =	27.82	VBUOY =	16.85	CHP =	653.6386	DX =	1.9155	V1 =	.00
H =	36.82	VBUOY =	19.20	CHP =	655.0629	DX =	1.4243	V1 =	.00
H =	47.02	VBUOY =	21.56	CHP =	656.1759	DX =	1.1130	V1 =	.00
H =	58.42	VBUOY =	23.91	CHP =	657.0684	DX =	.8925	V1 =	.00
H =	71.02	VBUOY =	26.26	CHP =	657.7994	DX =	.7309	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.6087	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00

	H =	84.82	VBUOY =	28.61	CHP =	658.4081	DX =	.0000	V1 =	.00
1	H =	99.52	VBUOY =	30.96	CHP =	658.8883	DX =	.4801	V1 =	.00
	H =	115.72	VBUOY =	33.31	CHP =	659.3359	DX =	.4476	V1 =	.00
	H =	132.82	VBUOY =	35.67	CHP =	659.7003	DX =	.3643	V1 =	.00
	H =	151.12	VBUOY =	38.02	CHP =	660.0226	DX =	.3222	V1 =	.00
	H =	170.92	VBUOY =	40.37	CHP =	660.3258	DX =	.3032	V1 =	.00
	H =	191.92	VBUOY =	42.72	CHP =	660.5940	DX =	.2682	V1 =	.00
	H =	213.52	VBUOY =	45.07	CHP =	660.8106	DX =	.2166	V1 =	.00
	H =	236.62	VBUOY =	47.43	CHP =	661.0183	DX =	.2077	V1 =	.00
	H =	260.92	VBUOY =	49.78	CHP =	661.2076	DX =	.1893	V1 =	.00
	H =	286.12	VBUOY =	52.13	CHP =	661.3723	DX =	.1647	V1 =	.00
	H =	317.92	VBUOY =	54.99	CHP =	661.5918	DX =	.2195	V1 =	2.86
	H =	353.92	VBUOY =	58.17	CHP =	661.7121	DX =	.1203	V1 =	6.04
	H =	392.92	VBUOY =	61.71	CHP =	661.8188	DX =	.1067	V1 =	9.57

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

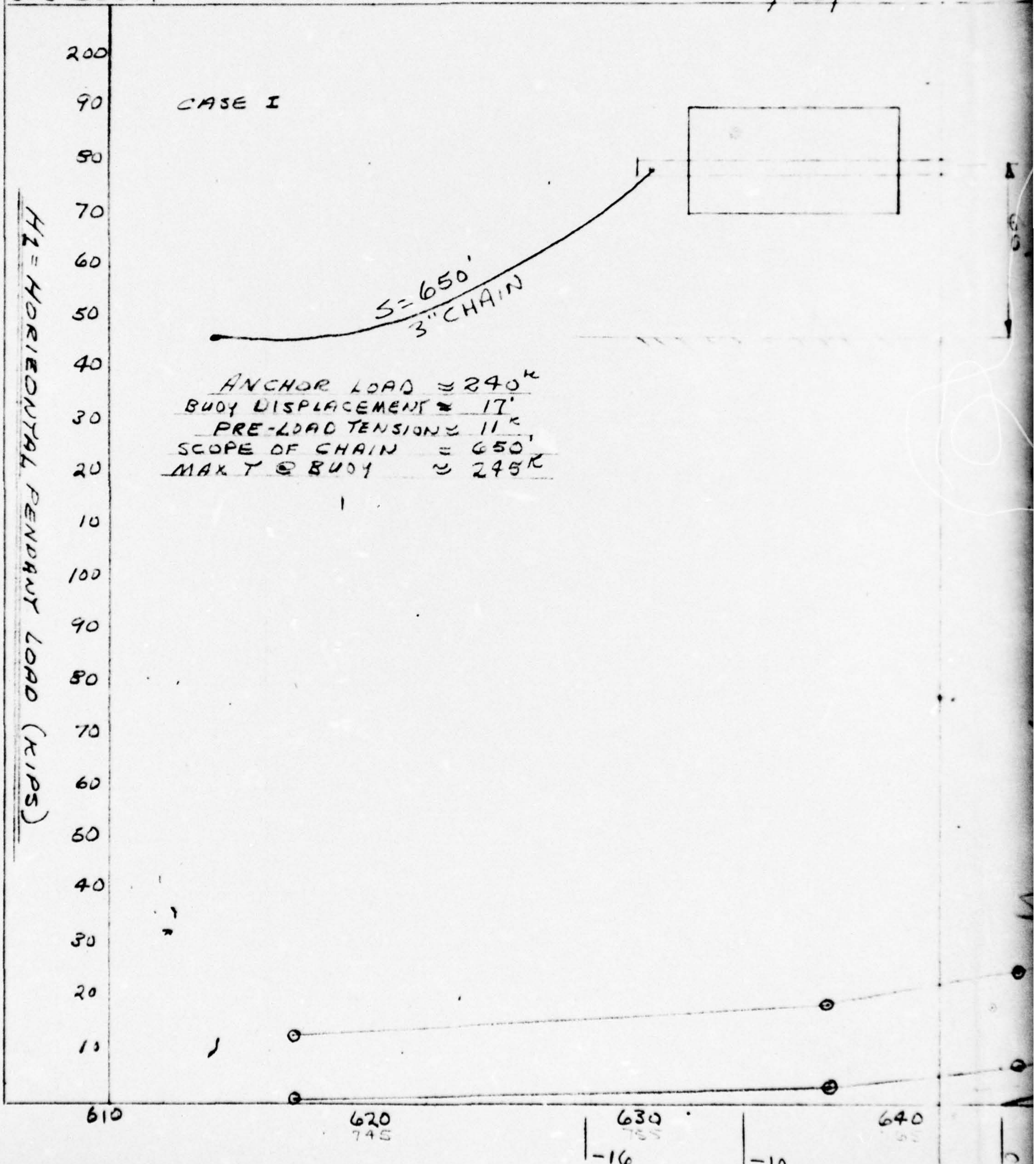
J. RAY McDERMOTT & CO., INC.

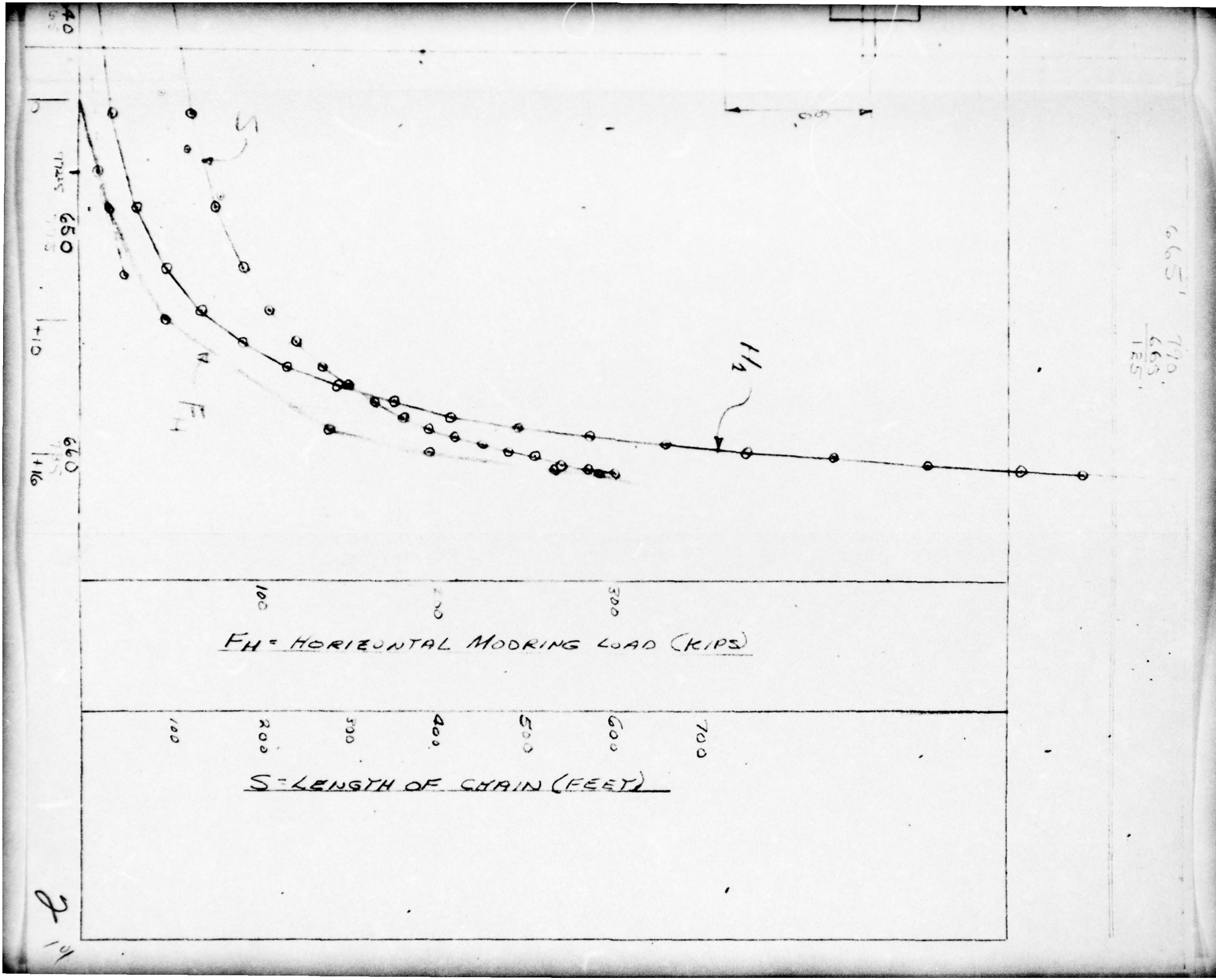
COMPANY: USA EROL

SHEET NO

SUBJECT: MONO-MOORING SYSTEM

NUMBER: JOB 56017 | COMPUTER: ANDREWS | CHECKED BY | DATE: 1/26/65





665'
790
665
125
H_1
S
F_H
640
650
660
+10
+16
100
200
300
F_H = HORIZONTAL MOORING LOAD (KIPS)
100
200
300
400
500
600
700
S = LENGTH OF CHAIN (FEET)

H=0 DELTA=3. VPCC=60 WW=10 W(1)=.0784 Tol=.1

W(3)=.0784 W(6)=.0784 A1=65 A2=20 A3=6.00

LOAD DATA ~~#1~~ 2

H =	.40	VBUOY =	5.09	CHP =	636.5848	DX =	.63658485E 03	V1 =	.00
H =	.58	VBUOY =	5.25	CHP =	639.5002	DX =	2.9153	V1 =	.00
H =	.76	VBUOY =	5.40	CHP =	641.8346	DX =	2.3344	V1 =	.00
H =	.94	VBUOY =	5.56	CHP =	643.7586	DX =	1.9240	V1 =	.00
H =	1.12	VBUOY =	5.72	CHP =	645.3742	DX =	1.6156	V1 =	.00
H =	1.33	VBUOY =	5.88	CHP =	647.2180	DX =	1.8437	V1 =	.00
H =	1.51	VBUOY =	6.03	CHP =	648.3633	DX =	1.1453	V1 =	.00
=	1.72	VBUOY =	6.19	CHP =	649.7520	DX =	1.3887	V1 =	.00
H =	1.93	VBUOY =	6.35	CHP =	650.9565	DX =	1.2044	V1 =	.00
H =	2.14	VBUOY =	6.50	CHP =	652.0082	DX =	1.0516	V1 =	.00
H =	2.35	VBUOY =	6.66	CHP =	652.9942	DX =	.9859	V1 =	.00
H =	3.64	VBUOY =	7.66	CHP =	656.6305	DX =	3.6362	V1 =	.00
H =	4.78	VBUOY =	8.66	CHP =	657.9340	DX =	1.3035	V1 =	.00
H =	5.89	VBUOY =	9.66	CHP =	658.7010	DX =	.7670	V1 =	.00
H =	6.94	VBUOY =	10.66	CHP =	659.0268	DX =	.3258	V1 =	.00
H =	7.99	VBUOY =	11.66	CHP =	659.2880	DX =	.2611	V1 =	.00
H =	9.04	VBUOY =	12.66	CHP =	659.5017	DX =	.2137	V1 =	.00
H =	10.06	VBUOY =	13.66	CHP =	659.5918	DX =	.0901	V1 =	.00

2

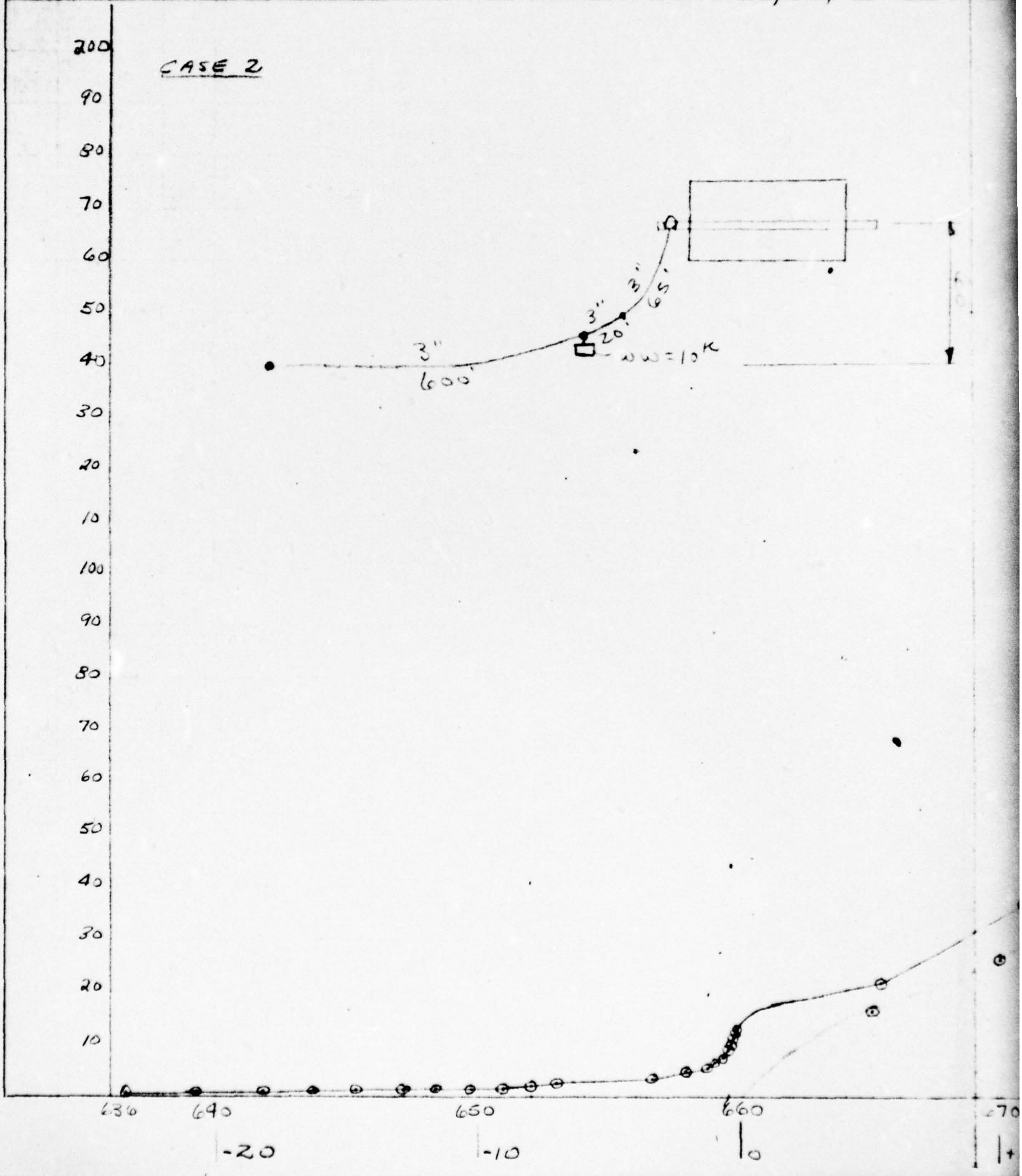
H =	11.08	VBUOY =	14.66	CHP =	659.6701	DX =	.0782	V1 =	.00
H =	12.10	VBUOY =	15.66	CHP =	659.7386	DX =	.0685	V1 =	.00
H =	13.12	VBUOY =	16.66	CHP =	659.7989	DX =	.0603	V1 =	.00
H =	21.97	VBUOY =	21.36	CHP =	665.2882	DX =	5.4892	V1 =	.00
H =	36.49	VBUOY =	26.07	CHP =	670.8405	DX =	5.5523	V1 =	.00
H =	55.69	VBUOY =	30.77	CHP =	674.3593	DX =	3.5187	V1 =	.00
H =	79.39	VBUOY =	35.47	CHP =	676.5836	DX =	2.2243	V1 =	.00
H =	107.29	VBUOY =	40.18	CHP =	678.0307	DX =	1.4471	V1 =	.00
H =	140.29	VBUOY =	44.88	CHP =	679.1090	DX =	1.0783	V1 =	.00
H =	177.49	VBUOY =	49.59	CHP =	679.8753	DX =	.7663	V1 =	.00
H =	219.49	VBUOY =	54.29	CHP =	680.4728	DX =	.5975	V1 =	.00
H =	266.29	VBUOY =	58.99	CHP =	680.9501	DX =	.4773	V1 =	.00
H =	317.59	VBUOY =	63.70	CHP =	681.3297	DX =	.3796	V1 =	.00
H =	353.89	VBUOY =	66.87	CHP =	681.5629	DX =	.2332	V1 =	3.17
H =	394.09	VBUOY =	70.41	CHP =	681.7079	DX =	.1450	V1 =	6.71
H =	439.09	VBUOY =	74.35	CHP =	681.8213	DX =	.1134	V1 =	10.65

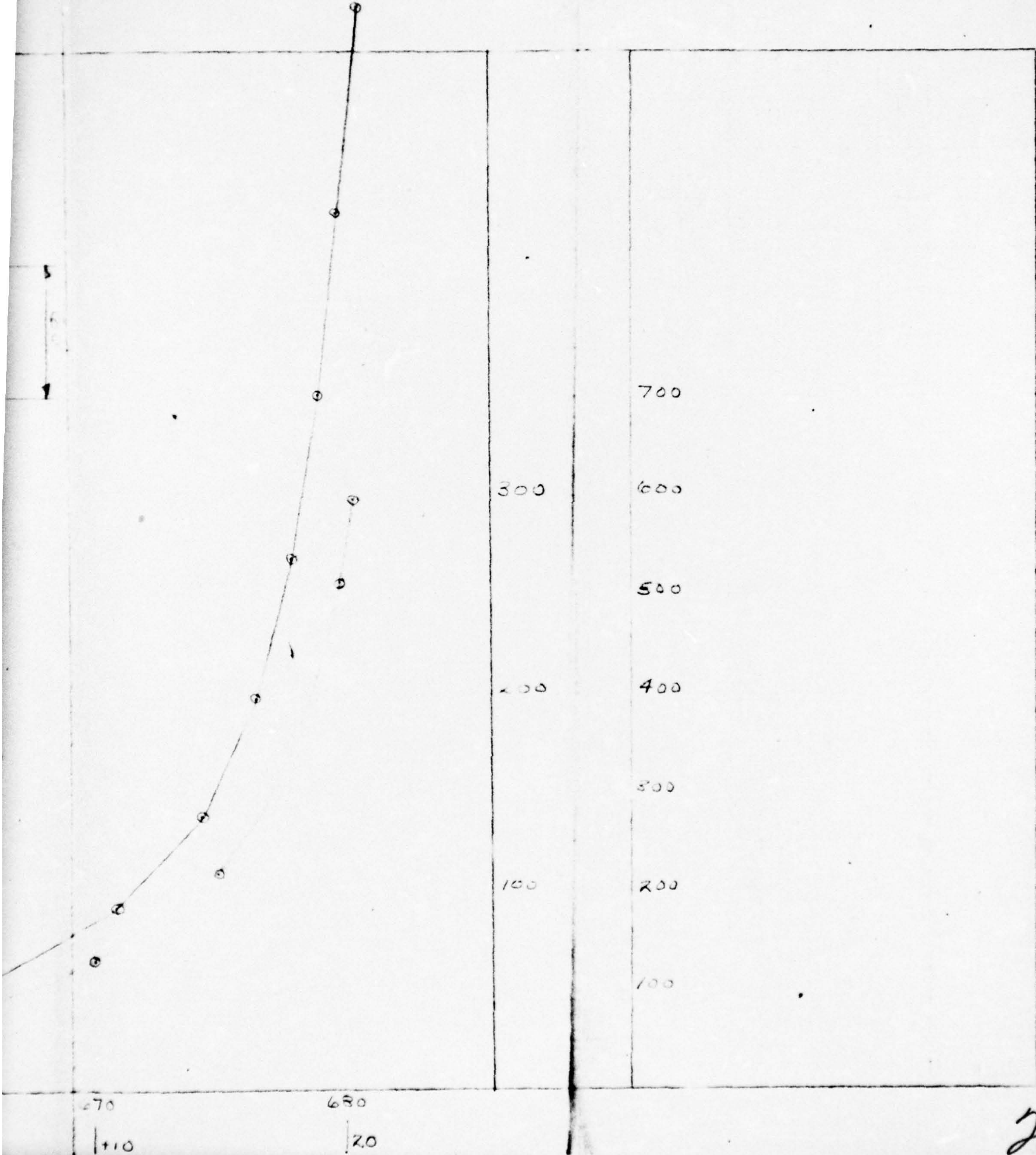
1

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5038

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO.
USA ERDL			
SUBJECT			
MONO - MOORING SYSTEM			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		1/29/65





2

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

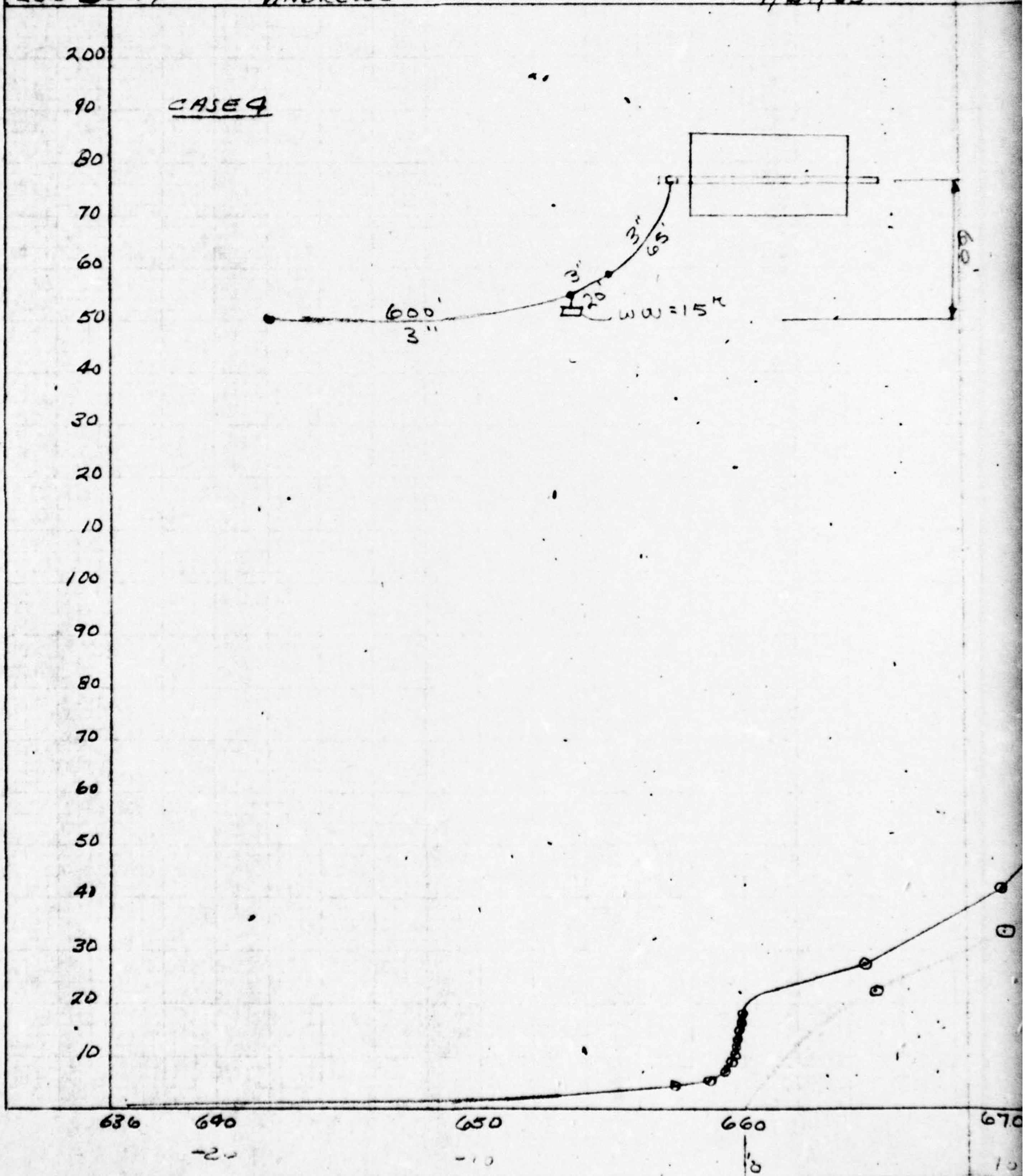
J. RAY McDERMOTT & Co., INC.

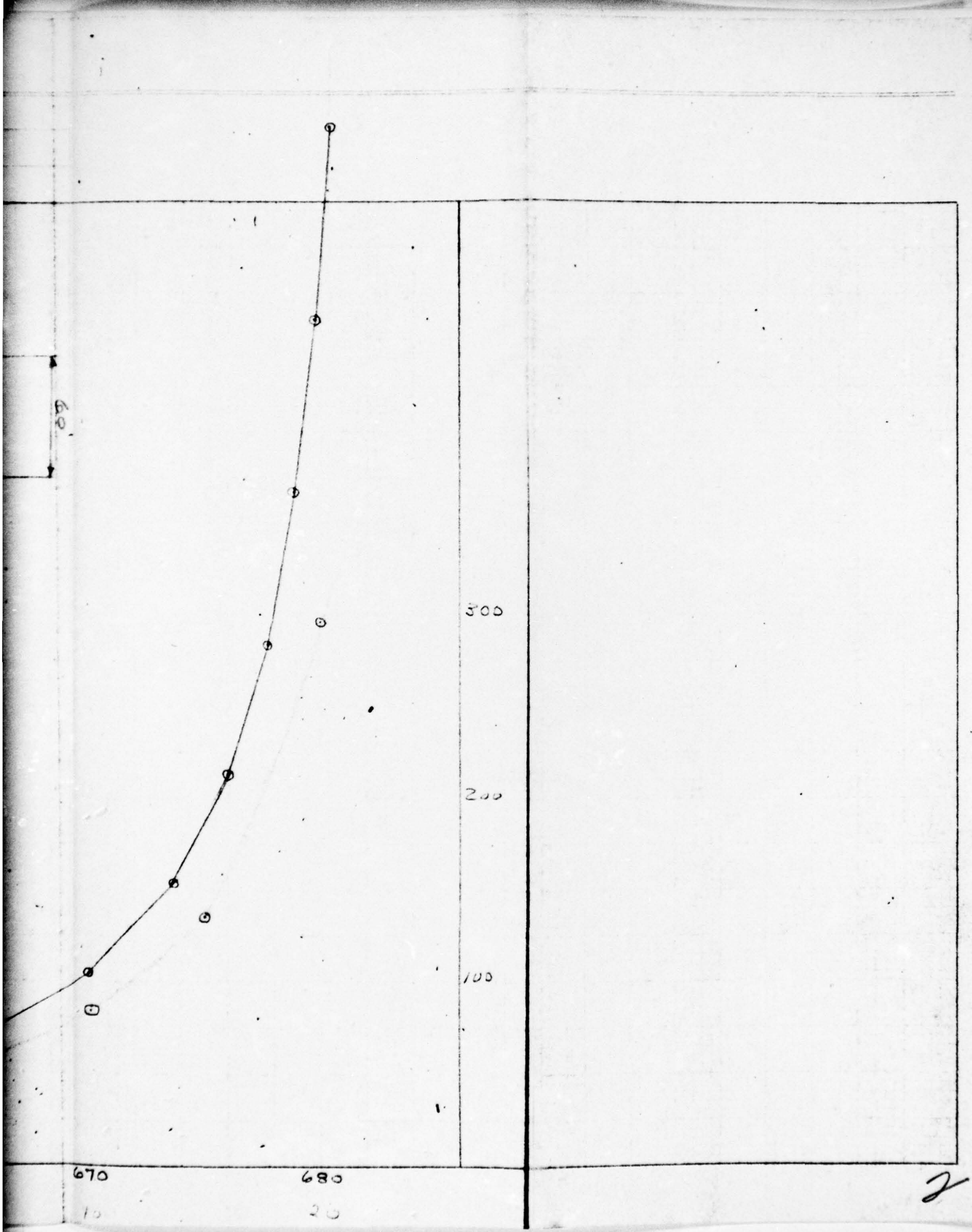
COMPANY: USA / EROL
SHEET NO

SUBJECT: MONO-MOORING SYSTEM

NUMBER: JOB 56017 | COMPUTER: ANDREWS | CHECKED BY | DATE: 1/29/65

CASE 4





300
200
100
670
680
10
20

H=0 DELTA=3. VPCC=60 WLW=15 W(1)=.0789 TOL=.1
W(3)=.0789 W(5)=.0789 A1=65 A2=20 A3=600

OAD DATA #4

H =	.40	VBUOY =	5.09	CHP =	636.5848	DX =	.63658485E 03	V1 =	.00
H =	.58	VBUOY =	5.25	CHP =	639.5002	DX =	2.9153	V1 =	.00
H =	.76	VBUOY =	5.40	CHP =	641.8346	DX =	2.3344	V1 =	.00
H =	.94	VBUOY =	5.56	CHP =	643.7586	DX =	1.9240	V1 =	.00
H =	1.12	VBUOY =	5.72	CHP =	645.3742	DX =	1.6156	V1 =	.00
H =	1.33	VBUOY =	5.88	CHP =	647.2180	DX =	1.8437	V1 =	.00
H =	1.51	VBUOY =	6.03	CHP =	648.3633	DX =	1.1453	V1 =	.00
H =	1.72	VBUOY =	6.19	CHP =	649.7520	DX =	1.3887	V1 =	.00
H =	1.93	VBUOY =	6.35	CHP =	650.9565	DX =	1.2044	V1 =	.00
H =	2.14	VBUOY =	6.50	CHP =	652.0082	DX =	1.0516	V1 =	.00
H =	2.35	VBUOY =	6.66	CHP =	652.9942	DX =	.9859	V1 =	.00
H =	4.24	VBUOY =	8.16	CHP =	657.5416	DX =	4.5474	V1 =	.00
H =	5.89	VBUOY =	9.66	CHP =	658.7010	DX =	1.1593	V1 =	.00
H =	7.48	VBUOY =	11.16	CHP =	659.2226	DX =	.5215	V1 =	.00
H =	9.04	VBUOY =	12.66	CHP =	659.5017	DX =	.2791	V1 =	.00
H =	10.57	VBUOY =	14.16	CHP =	659.6323	DX =	.1306	V1 =	.00
H =	12.10	VBUOY =	15.66	CHP =	659.7386	DX =	.1062	V1 =	.00
H =	13.63	VBUOY =	17.16	CHP =	659.8264	DX =	.0878	V1 =	.00

2 #4

H =	15.16	VBUOY =	18.66	CHP =	659.8999	DX =	.0735	V1 =	.00
H =	16.69	VBUOY =	20.16	CHP =	659.9624	DX =	.0624	V1 =	.00
H =	18.19	VBUOY =	21.66	CHP =	659.9667	DX =	.0043	V1 =	.00
H =	27.19	VBUOY =	26.36	CHP =	664.5899	DX =	4.6231	V1 =	.00
H =	41.95	VBUOY =	31.07	CHP =	669.9165	DX =	5.3266	V1 =	.00
H =	61.45	VBUOY =	35.77	CHP =	673.6135	DX =	3.6970	V1 =	.00
H =	85.45	VBUOY =	40.47	CHP =	676.0463	DX =	2.4327	V1 =	.00
H =	113.65	VBUOY =	45.18	CHP =	677.6567	DX =	1.6104	V1 =	.00
H =	146.65	VBUOY =	49.88	CHP =	678.8241	DX =	1.1674	V1 =	.00
=	184.15	VBUOY =	54.59	CHP =	679.6762	DX =	.8521	V1 =	.00
H =	226.15	VBUOY =	59.29	CHP =	680.3201	DX =	.6439	V1 =	.00
H =	272.95	VBUOY =	63.99	CHP =	680.8312	DX =	.5111	V1 =	.00
H =	324.25	VBUOY =	68.70	CHP =	681.2359	DX =	.4047	V1 =	.00
H =	361.45	VBUOY =	71.94	CHP =	681.4760	DX =	.2401	V1 =	3.24
H =	403.45	VBUOY =	75.56	CHP =	681.6534	DX =	.1774	V1 =	6.85
H =	448.45	VBUOY =	79.59	CHP =	681.7862	DX =	.1328	V1 =	10.89
H =	499.45	VBUOY =	84.08	CHP =	681.8985	DX =	.1123	V1 =	15.37

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
USA EROL	

SUBJECT	
MONO - MOORING SYSTEM	

JOB NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		2/2/65

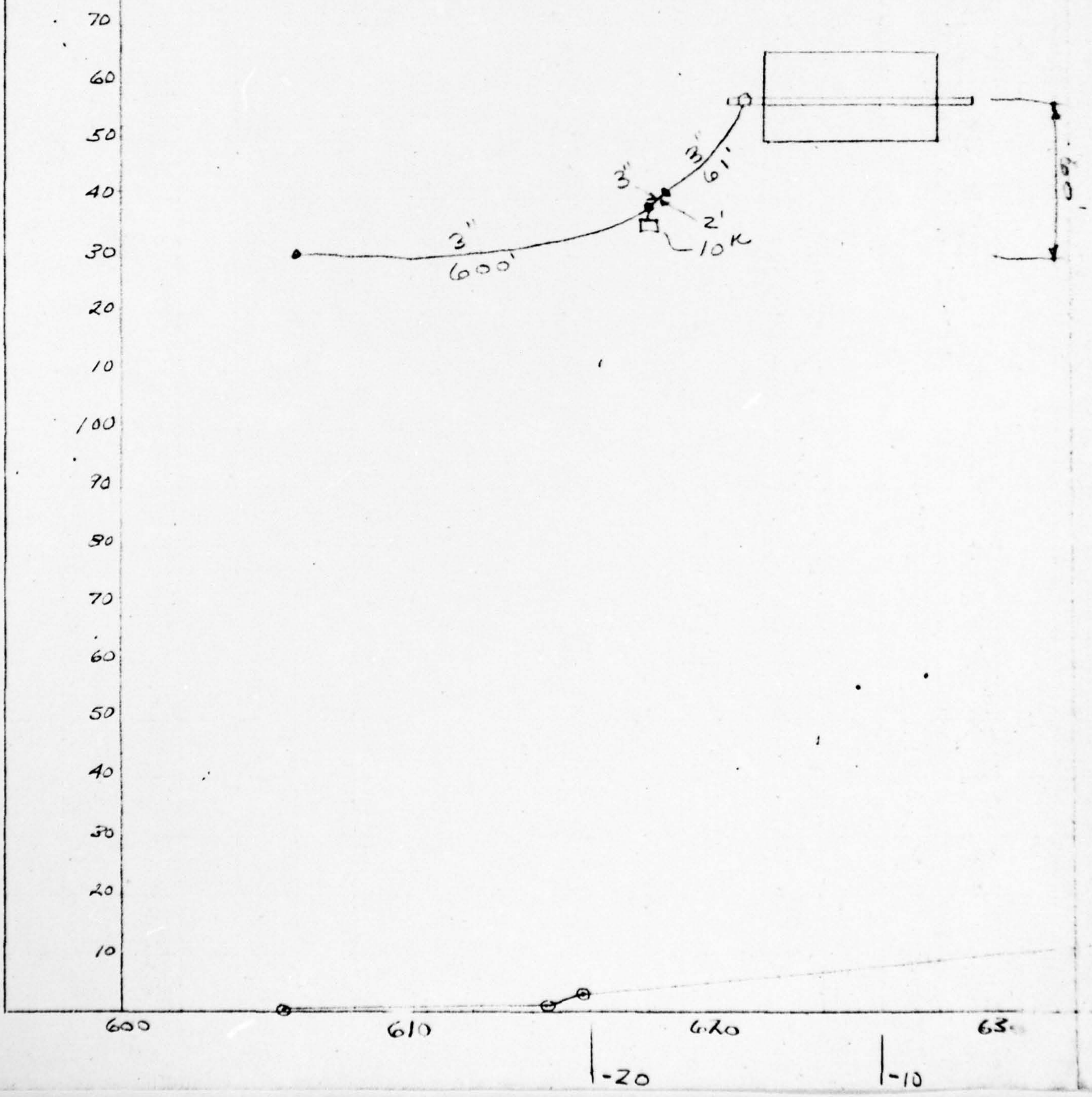
200

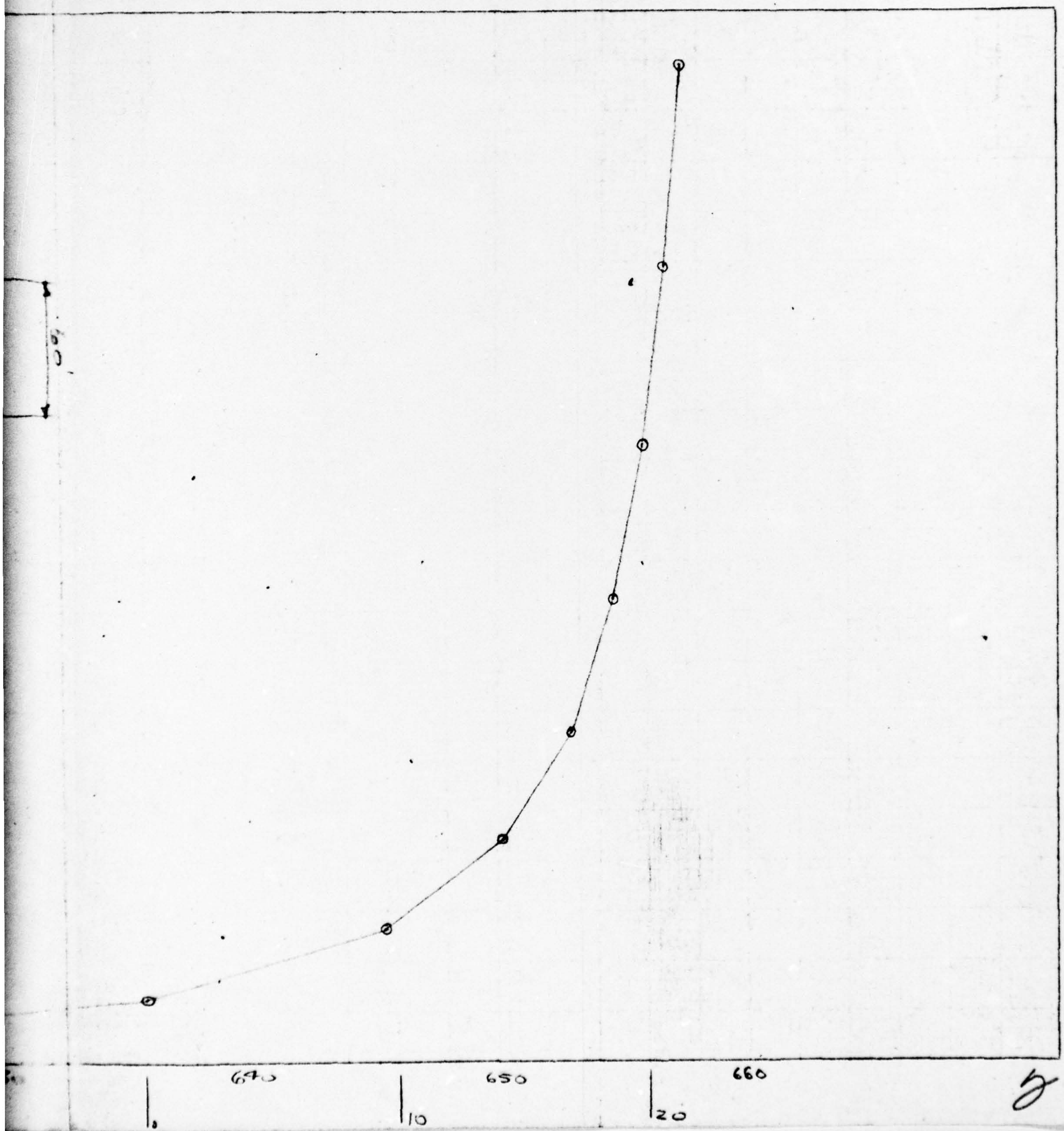
90

80

CASE 6

NOTE: IT MAYBE SEEN BY COMPARING H_1 CURVE WITH CASE I THAT F_H WILL APPROXIMATELY THE SAME.





640
650
660
0
10
20

#6 6

J. RAY McDERMOTT & CO., INC.
ENGINEERS AND GENERAL CONTRACTORS
NEW ORLEANS, LOUISIANA

LOAD DATA

H =	.07	VBUOY =	4.78	CHP =	605.4901	DX =	.60549011E 03	V1 =	
H =	.08	VBUOY =	4.79	CHP =	605.8314	DX =	.3412	V1 =	.00
H =	.09	VBUOY =	4.79	CHP =	606.1602	DX =	.3288	V1 =	.00
H =	.09	VBUOY =	4.80	CHP =	606.3406	DX =	.1803	V1 =	.00
H =	.10	VBUOY =	4.81	CHP =	606.6516	DX =	.3110	V1 =	.00
H =	.11	VBUOY =	4.82	CHP =	606.9531	DX =	.3015	V1 =	.00
H =	.12	VBUOY =	4.82	CHP =	607.1167	DX =	.1636	V1 =	.00
H =	.12	VBUOY =	4.83	CHP =	607.4042	DX =	.2874	V1 =	.00
H =	.13	VBUOY =	4.84	CHP =	607.6840	DX =	.2798	V1 =	.00
H =	.14	VBUOY =	4.85	CHP =	607.8343	DX =	.1502	V1 =	.00
H =	.15	VBUOY =	4.86	CHP =	608.1025	DX =	.2682	V1 =	.00
H =	.63	VBUOY =	5.86	CHP =	613.5917	DX =	5.4891	V1 =	.00
H =	.96	VBUOY =	6.86	CHP =	614.5442	DX =	.9524	V1 =	.00
H =	1.26	VBUOY =	7.86	CHP =	614.9504	DX =	.4062	V1 =	.00
H =	1.56	VBUOY =	8.86	CHP =	615.2886	DX =	.3381	V1 =	.00
H =	1.86	VBUOY =	9.86	CHP =	615.5624	DX =	.2737	V1 =	.00
H =	2.07	VBUOY =	10.86	CHP =	615.1719	DX =	-.3904	V1 =	.00
H =	2.37	VBUOY =	11.86	CHP =	615.4252	DX =	.2532	V1 =	.00
H =	2.67	VBUOY =	12.86	CHP =	615.6343	DX =	.2091	V1 =	.00

(6)

J. RAY McDERMOTT & CO., INC.
ENGINEERS AND GENERAL CONTRACTORS
NEW ORLEANS, LOUISIANA

H = 2.97	VBUOY = 13.86	CHP = 615.8100	DX = .1756	V1 = .00
H = 3.12	VBUOY = 14.86	CHP = 615.2751	DX = -.5349	V1 = .00
H = 12.87	VBUOY = 19.56	CHP = 636.0530	DX = 20.7779	V1 = .00
H = 26.49	VBUOY = 24.26	CHP = 645.4608	DX = 9.4077	V1 = .00
H = 44.19	VBUOY = 28.97	CHP = 650.2196	DX = 4.7587	V1 = .00
H = 66.09	VBUOY = 33.67	CHP = 652.9179	DX = 2.6982	V1 = .00
H = 92.49	VBUOY = 38.38	CHP = 654.6414	DX = 1.7235	V1 = .00
H = 123.39	VBUOY = 43.08	CHP = 655.8164	DX = 1.1750	V1 = .00
H = 159.09	VBUOY = 47.78	CHP = 656.6798	DX = .8634	V1 = .00
H = 199.29	VBUOY = 52.49	CHP = 657.3222	DX = .6424	V1 = .00
H = 244.29	VBUOY = 57.19	CHP = 657.8299	DX = .5077	V1 = .00
H = 293.49	VBUOY = 61.90	CHP = 658.2249	DX = .3950	V1 = .00

H=0 DELTA=3 VPCC=60 WN=10 W(4)=.0789 TOL=.1
W(3)=.0784 W(5)=.0789 A1=65 A2=90 A3=600

LOAD DATA #2

H =	.40	VBUOY =	5.09	CHP =	656.5848	DX =	.65658485E 03	V1 =	.00
H =	.76	VBUOY =	5.40	CHP =	661.8346	DX =	5.2498	V1 =	.00
H =	1.12	VBUOY =	5.72	CHP =	665.3742	DX =	3.5396	V1 =	.00
H =	1.51	VBUOY =	6.03	CHP =	668.3633	DX =	2.9890	V1 =	.00
H =	1.93	VBUOY =	6.35	CHP =	670.9565	DX =	2.5932	V1 =	.00
H =	2.35	VBUOY =	6.66	CHP =	672.9942	DX =	2.0376	V1 =	.00
H =	2.81	VBUOY =	6.97	CHP =	674.8236	DX =	1.8294	V1 =	.00
H =	3.29	VBUOY =	7.29	CHP =	676.4790	DX =	1.6553	V1 =	.00
H =	3.80	VBUOY =	7.60	CHP =	678.0065	DX =	1.5274	V1 =	.00
H =	4.31	VBUOY =	7.91	CHP =	679.2318	DX =	1.2253	V1 =	.00
H =	4.85	VBUOY =	8.23	CHP =	680.3931	DX =	1.1612	V1 =	.00
H =	6.53	VBUOY =	9.23	CHP =	682.7469	DX =	2.3538	V1 =	.00
H =	8.09	VBUOY =	10.23	CHP =	683.7947	DX =	1.0477	V1 =	.00
H =	9.62	VBUOY =	11.23	CHP =	684.4280	DX =	.6333	V1 =	.00
H =	11.15	VBUOY =	12.23	CHP =	684.8919	DX =	.4639	V1 =	.00
H =	12.65	VBUOY =	13.23	CHP =	685.1810	DX =	.2890	V1 =	.00
H =	14.15	VBUOY =	14.23	CHP =	685.4098	DX =	.2287	V1 =	.00
H =	15.59	VBUOY =	15.23	CHP =	685.4882	DX =	.0783	V1 =	.00
H =	17.09	VBUOY =	16.23	CHP =	685.6512	DX =	.1630	V1 =	.00

+2 (2)

I =	18.50	VBUOY =	17.23	CHP =	685.6527	DX =	.0014	V1 =	.00
H =	20.00	VBUOY =	18.23	CHP =	685.7801	DX =	.1273	V1 =	.00
H =	30.20	VBUOY =	22.93	CHP =	688.8404	DX =	3.0603	V1 =	.00
H =	45.80	VBUOY =	27.63	CHP =	692.5351	DX =	3.6947	V1 =	.00
H =	66.20	VBUOY =	32.34	CHP =	695.2211	DX =	2.6860	V1 =	.00
H =	91.40	VBUOY =	37.04	CHP =	697.1004	DX =	1.8792	V1 =	.00
H =	121.10	VBUOY =	41.75	CHP =	698.4015	DX =	1.3011	V1 =	.00
H =	155.30	VBUOY =	46.45	CHP =	699.3401	DX =	.9386	V1 =	.00
=	194.30	VBUOY =	51.16	CHP =	700.0591	DX =	.7190	V1 =	.00
H =	237.80	VBUOY =	55.86	CHP =	700.6126	DX =	.5535	V1 =	.00
H =	286.10	VBUOY =	60.56	CHP =	701.0584	DX =	.4458	V1 =	.00
H =	338.90	VBUOY =	65.27	CHP =	701.4200	DX =	.3616	V1 =	.00
H =	378.80	VBUOY =	68.66	CHP =	701.6321	DX =	.2121	V1 =	3.38
H =	423.80	VBUOY =	72.44	CHP =	701.8235	DX =	.1914	V1 =	7.17
H =	473.00	VBUOY =	76.68	CHP =	701.9284	DX =	.1049	V1 =	11.41

LOAD DATA #3

=	.40	VBUOY =	5.09	CHP =	656.5848	DX =	.65658485E 03	V1 =	.00
H =	.76	VBUOY =	5.40	CHP =	661.8346	DX =	5.2498	V1 =	.00
H =	1.12	VBUOY =	5.72	CHP =	665.3742	DX =	3.5396	V1 =	.00
H =	1.51	VBUOY =	6.03	CHP =	668.3633	DX =	2.9890	V1 =	.00
H =	1.93	VBUOY =	6.35	CHP =	670.9565	DX =	2.5932	V1 =	.00
H =	2.35	VBUOY =	6.66	CHP =	672.9942	DX =	2.0376	V1 =	.00
H =	2.81	VBUOY =	6.97	CHP =	674.8236	DX =	1.8294	V1 =	.00
H =	3.29	VBUOY =	7.29	CHP =	676.4790	DX =	1.6553	V1 =	.00
H =	3.80	VBUOY =	7.60	CHP =	678.0065	DX =	1.5274	V1 =	.00
H =	4.31	VBUOY =	7.91	CHP =	679.2318	DX =	1.2253	V1 =	.00
H =	4.85	VBUOY =	8.23	CHP =	680.3931	DX =	1.1612	V1 =	.00
H =	7.31	VBUOY =	9.73	CHP =	683.3250	DX =	2.9318	V1 =	.00
H =	9.62	VBUOY =	11.23	CHP =	684.4280	DX =	1.1030	V1 =	.00
H =	11.90	VBUOY =	12.73	CHP =	685.0454	DX =	.6174	V1 =	.00
H =	14.12	VBUOY =	14.23	CHP =	685.3505	DX =	.3051	V1 =	.00
H =	16.31	VBUOY =	15.73	CHP =	685.5220	DX =	.1714	V1 =	.00
H =	18.50	VBUOY =	17.23	CHP =	685.6527	DX =	.1307	V1 =	.00
H =	20.69	VBUOY =	18.73	CHP =	685.7558	DX =	.1030	V1 =	.00
H =	22.85	VBUOY =	20.23	CHP =	685.8024	DX =	.0465	V1 =	.00

A=0 DELTA=3. VPCC=60 WN=15 W(1)=.0784 TOL=.1
W(3)=.0784 W(4)=.0784 A1=65 A2=90 A3=600

#3 2

H =	25.01	VBUOY =	21.73	CHP =	685.8408	DX =	.0384	V1 =	.00
H =	27.20	VBUOY =	23.23	CHP =	685.9041	DX =	.0632	V1 =	.00
H =	37.40	VBUOY =	27.93	CHP =	688.3889	DX =	2.4848	V1 =	.00
H =	53.30	VBUOY =	32.63	CHP =	691.9385	DX =	3.5495	V1 =	.00
H =	74.00	VBUOY =	37.34	CHP =	694.6926	DX =	2.7541	V1 =	.00
H =	99.20	VBUOY =	42.04	CHP =	696.6430	DX =	1.9504	V1 =	.00
H =	129.20	VBUOY =	46.75	CHP =	698.0668	DX =	1.4238	V1 =	.00
H =	163.40	VBUOY =	51.45	CHP =	699.0785	DX =	1.0117	V1 =	.00
H =	202.40	VBUOY =	56.16	CHP =	699.8549	DX =	.7764	V1 =	.00
H =	246.20	VBUOY =	60.86	CHP =	700.4636	DX =	.6087	V1 =	.00
H =	294.50	VBUOY =	65.56	CHP =	700.9408	DX =	.4772	V1 =	.00
H =	347.30	VBUOY =	70.27	CHP =	701.3239	DX =	.3831	V1 =	.00
H =	389.30	VBUOY =	73.74	CHP =	701.6186	DX =	.2947	V1 =	3.47
H =	434.30	VBUOY =	77.63	CHP =	701.7342	DX =	.1156	V1 =	7.36
H =	485.30	VBUOY =	81.98	CHP =	701.8735	DX =	.1393	V1 =	11.70

J. RAY McDERMOTT & CO., INC.

ENGINEERS AND GENERAL CONTRACTORS

NEW ORLEANS, LOUISIANA

H =	.07	VBUOY =	4.78	CHP =	605.4901	DX =	.60549011E 03	V1 =	
H =	.08	VBUOY =	4.79	CHP =	605.8314	DX =	.3412	V1 =	.00
H =	.09	VBUOY =	4.79	CHP =	606.1602	DX =	.3288	V1 =	.00
H =	.09	VBUOY =	4.80	CHP =	606.3406	DX =	.1803	V1 =	.00
H =	.10	VBUOY =	4.81	CHP =	606.6516	DX =	.3110	V1 =	.00
H =	.11	VBUOY =	4.82	CHP =	606.9531	DX =	.3015	V1 =	.00
H =	.12	VBUOY =	4.82	CHP =	607.1167	DX =	.1636	V1 =	.00
H =	.12	VBUOY =	4.83	CHP =	607.4042	DX =	.2874	V1 =	.00
H =	.13	VBUOY =	4.84	CHP =	607.6840	DX =	.2798	V1 =	.00
H =	.14	VBUOY =	4.85	CHP =	607.8343	DX =	.1502	V1 =	.00
H =	.15	VBUOY =	4.86	CHP =	608.1025	DX =	.2682	V1 =	.00
H =	.81	VBUOY =	6.36	CHP =	614.3341	DX =	6.2315	V1 =	.00
H =	1.26	VBUOY =	7.86	CHP =	614.9504	DX =	.6163	V1 =	.00
H =	1.65	VBUOY =	9.36	CHP =	614.9279	DX =	-.0225	V1 =	.00
H =	2.07	VBUOY =	10.86	CHP =	615.1719	DX =	.2440	V1 =	.00
H =	2.46	VBUOY =	12.36	CHP =	615.1888	DX =	.0168	V1 =	.00
H =	2.85	VBUOY =	13.86	CHP =	615.2126	DX =	.0238	V1 =	.00
H =	3.24	VBUOY =	15.36	CHP =	615.2374	DX =	.0247	V1 =	.00

#5 (2)

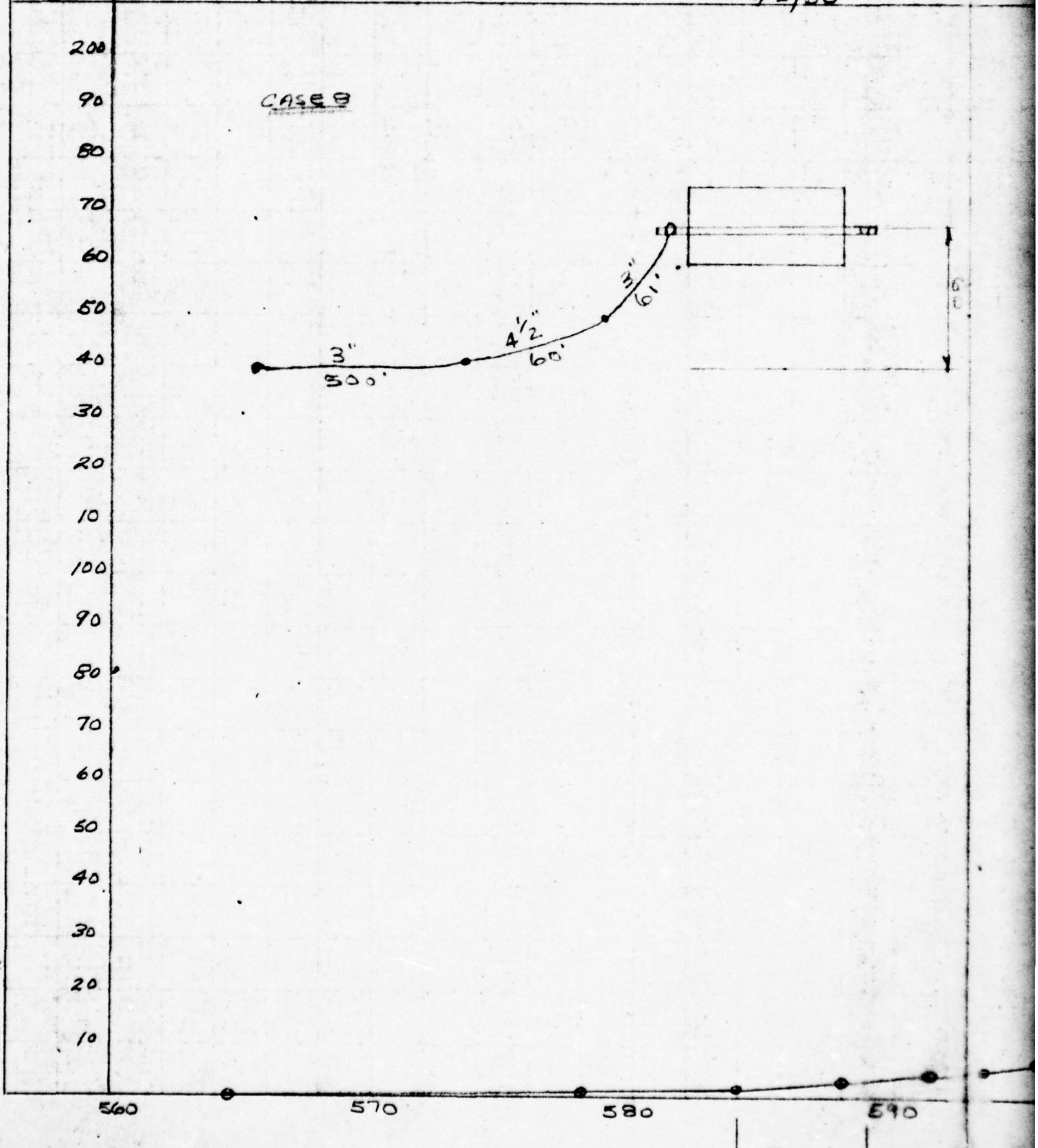
J. RAY McDERMOTT & CO., INC.
ENGINEERS AND GENERAL CONTRACTORS
NEW ORLEANS, LOUISIANA

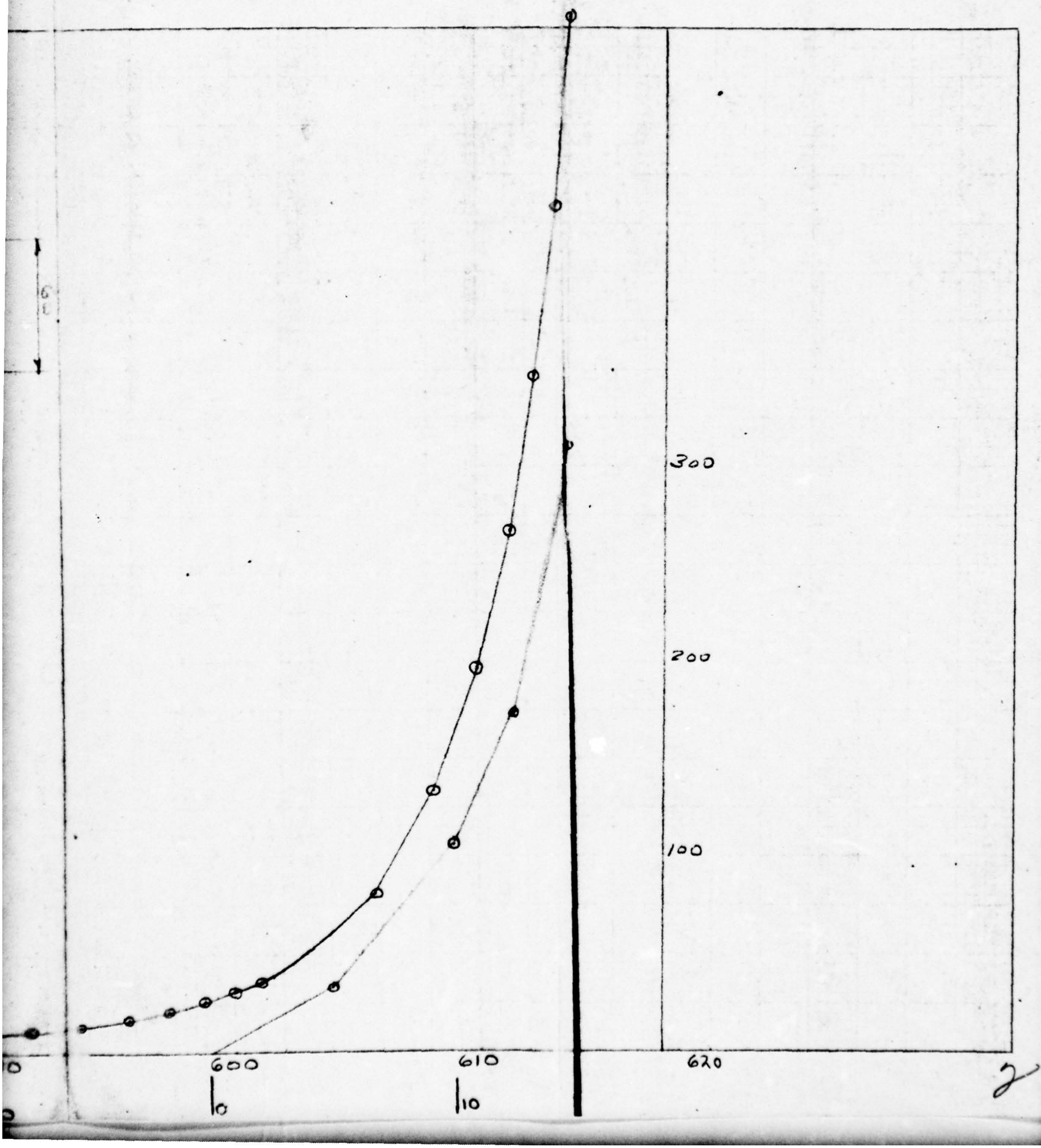
H =	3.63	VBUOY =	16.86	CHP =	615.2609	DX =	.0234	V1 =	.00
H =	3.99	VBUOY =	18.36	CHP =	615.1754	DX =	-.0854	V1 =	.00
H =	4.59	VBUOY =	19.86	CHP =	615.8852	DX =	.7097	V1 =	.00
H =	15.21	VBUOY =	24.56	CHP =	634.2503	DX =	18.3651	V1 =	.00
H =	29.70	VBUOY =	29.26	CHP =	644.0916	DX =	9.8412	V1 =	.00
H =	48.00	VBUOY =	33.97	CHP =	649.3165	DX =	5.2249	V1 =	.00
H =	70.20	VBUOY =	38.67	CHP =	652.3030	DX =	2.9864	V1 =	.00
H =	96.90	VBUOY =	43.38	CHP =	654.2368	DX =	1.9338	V1 =	.00
H =	128.10	VBUOY =	48.08	CHP =	655.5491	DX =	1.3123	V1 =	.00
H =	164.10	VBUOY =	52.78	CHP =	656.5016	DX =	.9525	V1 =	.00
H =	204.00	VBUOY =	57.49	CHP =	657.1751	DX =	.6735	V1 =	.00
H =	249.00	VBUOY =	62.19	CHP =	657.7202	DX =	.5451	V1 =	.00
H =	298.50	VBUOY =	66.90	CHP =	658.1457	DX =	.4255	V1 =	.00

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
USA ERDL			
SUBJECT			
MONO - MOORING SYSTEM			
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		2/2/65





300
200
100
600
610
620
0
10

#3

#2 H=0 DELTA=3.0 VPCC=6.0 WW=0 W(1)=.0789 TOL=.1
W(3)=.172 W(5)=.0789 A1=61 A2=60 A3=500

D DATA

H =	.07	VBUOY =	4.78	CHP =	564.4901	DX =	.56449011E 03	V1 =	.00
H =	.94	VBUOY =	5.81	CHP =	578.0810	DX =	13.5909	V1 =	.00
H =	1.90	VBUOY =	6.84	CHP =	583.9294	DX =	5.8484	V1 =	.00
H =	3.01	VBUOY =	7.87	CHP =	588.0661	DX =	4.1366	V1 =	.00
H =	4.27	VBUOY =	8.91	CHP =	591.2960	DX =	3.2299	V1 =	.00
H =	5.62	VBUOY =	9.94	CHP =	593.6547	DX =	2.3586	V1 =	.00
H =	7.12	VBUOY =	10.97	CHP =	595.7229	DX =	2.0682	V1 =	.00
=	8.71	VBUOY =	12.00	CHP =	597.3619	DX =	1.6389	V1 =	.00
H =	10.42	VBUOY =	13.03	CHP =	598.7886	DX =	1.4266	V1 =	.00
H =	12.25	VBUOY =	14.07	CHP =	600.0489	DX =	1.2602	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	1.0681	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00

#2 8

H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	14.17	VBUOY =	15.10	CHP =	601.1170	DX =	.0000	V1 =	.00
H =	32.17	VBUOY =	23.70	CHP =	605.7871	DX =	4.6701	V1 =	.00
H =	53.50	VBUOY =	32.30	CHP =	608.2045	DX =	2.4173	V1 =	.00
H =	78.40	VBUOY =	40.90	CHP =	609.9768	DX =	1.7722	V1 =	.00
H =	106.90	VBUOY =	49.50	CHP =	611.3647	DX =	1.3878	V1 =	.00
H =	138.40	VBUOY =	58.10	CHP =	612.4169	DX =	1.0522	V1 =	.00
H =	173.50	VBUOY =	66.70	CHP =	613.3048	DX =	.8879	V1 =	.00
H =	212.50	VBUOY =	75.30	CHP =	614.0744	DX =	.7696	V1 =	.00
H =	253.60	VBUOY =	83.90	CHP =	614.6586	DX =	.5842	V1 =	.00
H =	298.90	VBUOY =	92.50	CHP =	615.1975	DX =	.5389	V1 =	.00
H =	347.20	VBUOY =	101.10	CHP =	615.6503	DX =	.4528	V1 =	.00
H =	392.20	VBUOY =	108.71	CHP =	616.0346	DX =	.3843	V1 =	3.47

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: USA EROL

SHEET NO:

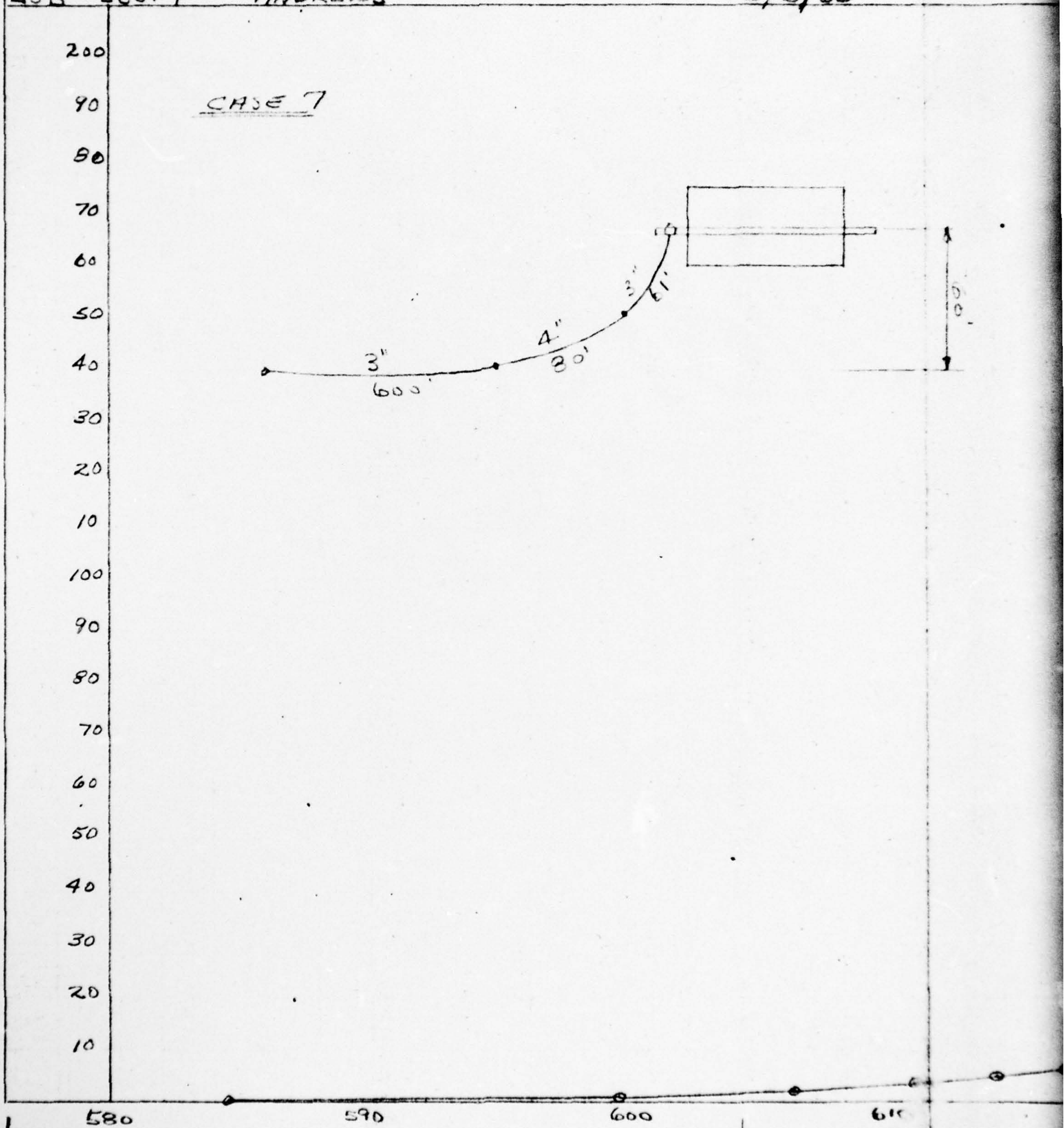
SUBJECT: MONO-MOORING SYSTEM

NUMBER: JOB - 56017

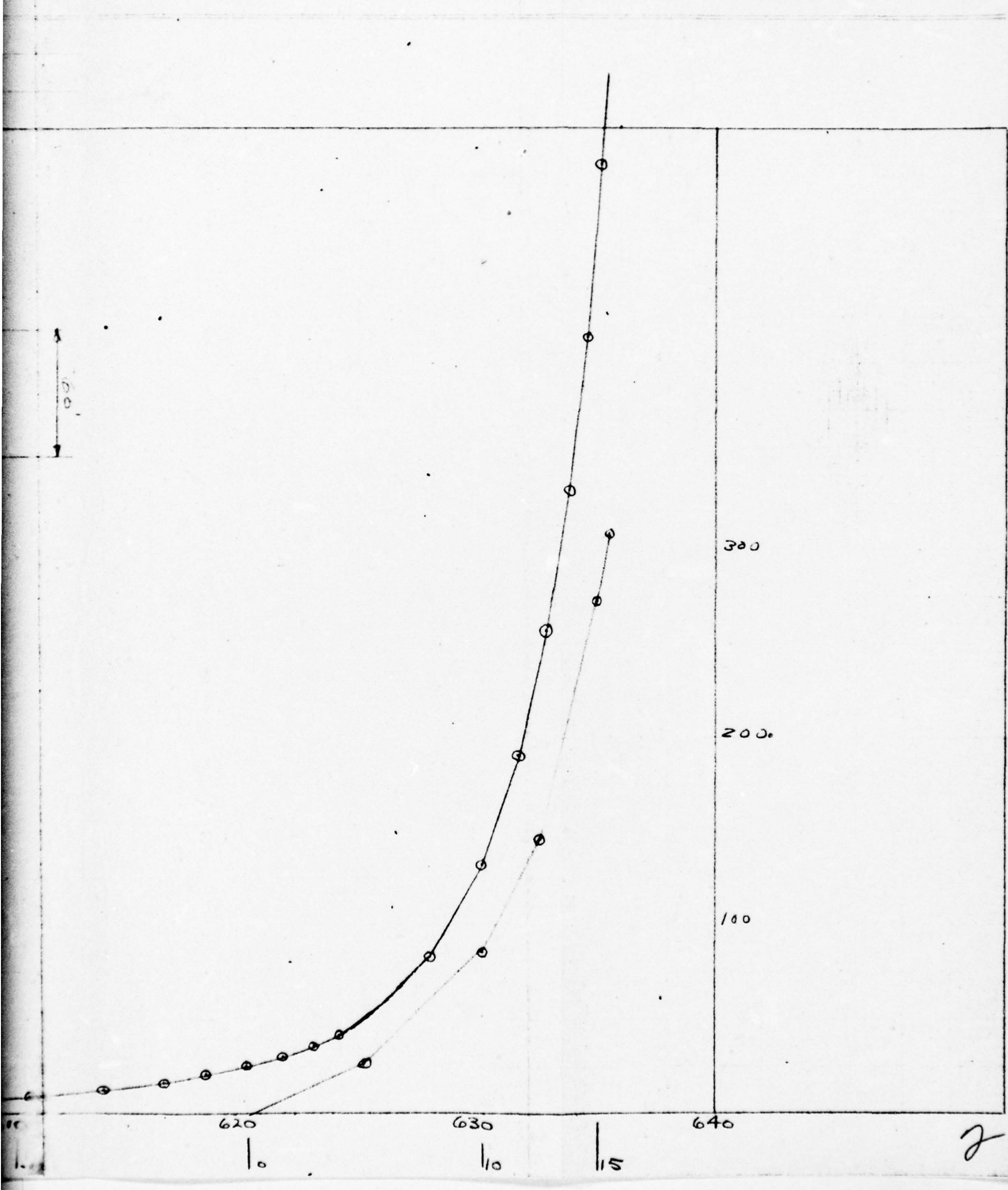
COMPUTER: ANDREWS

CHECKED BY:

DATE: 2/2/65



-16



300
200
100
620
630
640
0
10
15

H=0 DELTA=3.0 YPC=60 WW=0 W(1)=.0789 TOL=.1

#1 W(3)=.13 W(5)=.0789 A1=61 A2=80 A3=800

#7

LOAD DATA

H =	.07	VBUOY =	4.78	CHP =	584.4901	DX =	.58449011E 03	V1 =	.00
H =	1.03	VBUOY =	5.82	CHP =	599.3679	DX =	14.8778	V1 =	.00
H =	2.14	VBUOY =	6.86	CHP =	606.0394	DX =	6.7214	V1 =	.00
H =	3.43	VBUOY =	7.90	CHP =	610.6357	DX =	4.5462	V1 =	.00
H =	4.87	VBUOY =	8.94	CHP =	613.9037	DX =	3.2680	V1 =	.00
H =	6.46	VBUOY =	9.98	CHP =	616.4261	DX =	2.5224	V1 =	.00
H =	8.17	VBUOY =	11.02	CHP =	618.3616	DX =	1.9354	V1 =	.00
H =	10.06	VBUOY =	12.06	CHP =	620.0780	DX =	1.7164	V1 =	.00
H =	12.10	VBUOY =	13.10	CHP =	621.5374	DX =	1.4593	V1 =	.00
H =	14.29	VBUOY =	14.14	CHP =	622.7991	DX =	1.2617	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	1.0591	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00

#1 7

=	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	16.60	VBUOY =	15.18	CHP =	623.8583	DX =	.0000	V1 =	.00
H =	33.10	VBUOY =	21.68	CHP =	627.8238	DX =	3.9655	V1 =	.00
H =	52.90	VBUOY =	28.18	CHP =	630.0371	DX =	2.2133	V1 =	.00
H =	76.00	VBUOY =	34.68	CHP =	631.5910	DX =	1.5538	V1 =	.00
H =	102.70	VBUOY =	41.18	CHP =	632.8171	DX =	1.2260	V1 =	.00
H =	132.70	VBUOY =	47.68	CHP =	633.7688	DX =	.9516	V1 =	.00
H =	165.70	VBUOY =	54.18	CHP =	634.5092	DX =	.7404	V1 =	.00
H =	202.00	VBUOY =	60.68	CHP =	635.1253	DX =	.6161	V1 =	.00
H =	241.60	VBUOY =	67.18	CHP =	635.6451	DX =	.5198	V1 =	.00
H =	284.50	VBUOY =	73.68	CHP =	636.0864	DX =	.4413	V1 =	.00
H =	331.00	VBUOY =	80.18	CHP =	636.4713	DX =	.3849	V1 =	.00
H =	371.20	VBUOY =	85.67	CHP =	636.7574	DX =	.2861	V1 =	3.31

(1.)

COMPUTATION SHEET
ENGINEERING DEPARTMENT
ED 5011

J. RAY McDERMOTT & Co., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

PREL.

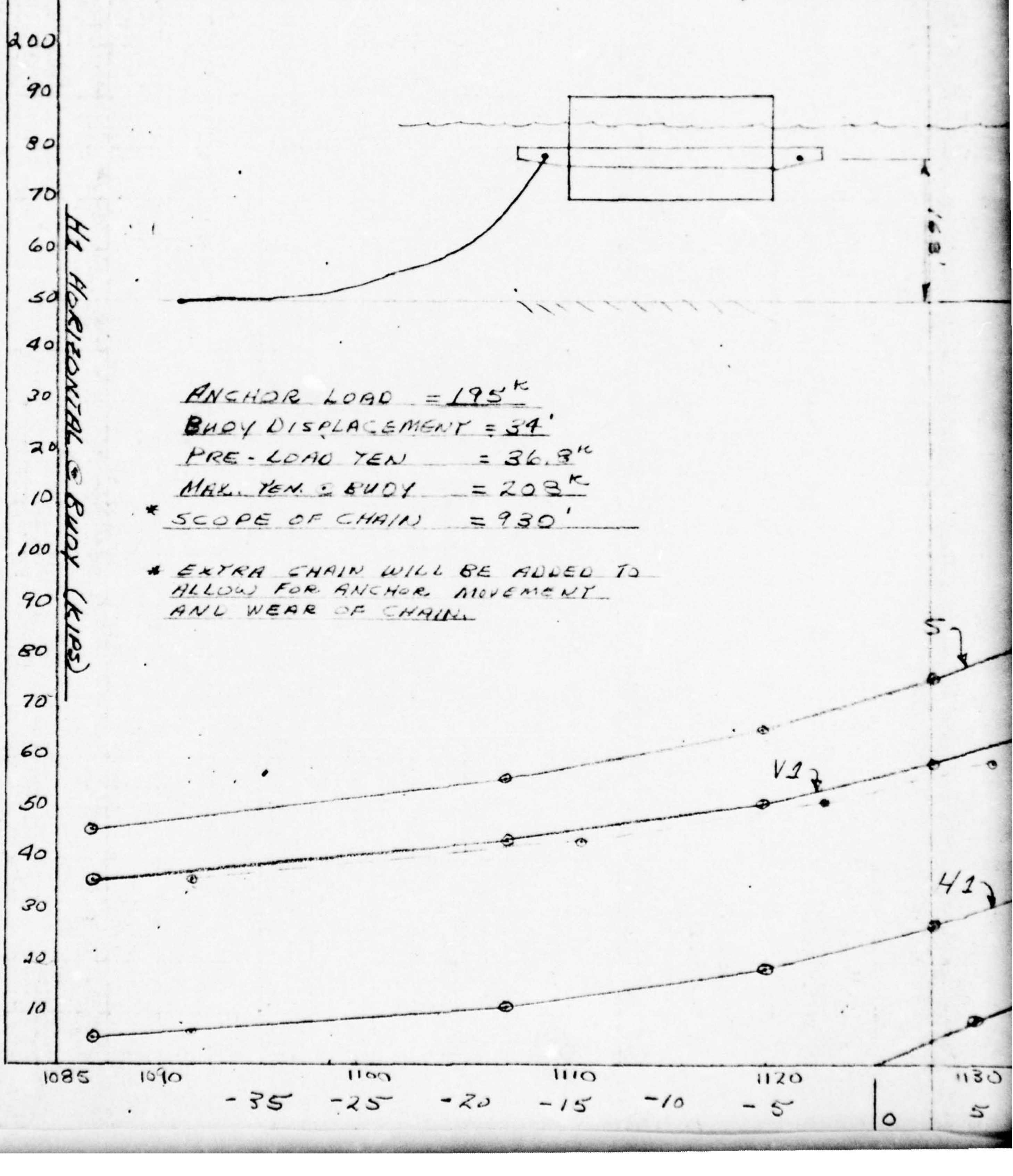
MISC. INFORMATION ON

BUOY SIZE & BUOYANCY

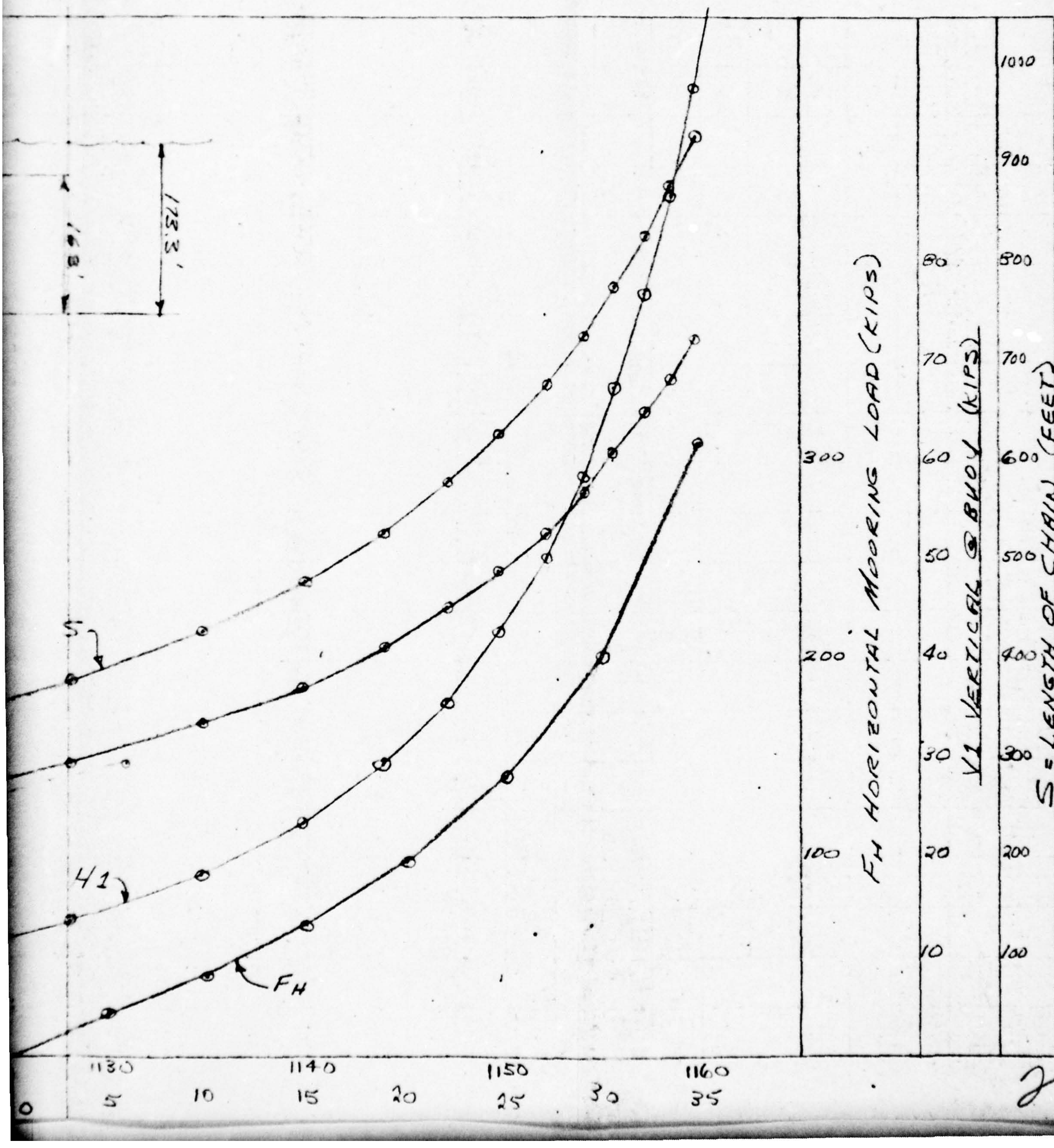
ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO.
U.S. ARMY / ERDL			2
SUBJECT: MONO - MOORING SYSTEM			
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		3/12/65



CURVES FOR 150' W.D.



U.S. ARMY/ERDL MONO-MOORING SYSTEM 3/15/65

U=0 DELTA=3.0 VPCC=168 WW=0 W(1)=.0789 T=1.1

W(2)=.0789 W(3)=.0784 A1=180 A2=500 A3=500

LOAD DATA

H =	.96	VBUOY =	14.11	CHP =	1041.5963	DX =	.10415963E 04	V1 =	
H =	5.76	VBUOY =	18.03	CHP =	1086.6447	DX =	45.0484	V1 =	.00
H =	11.70	VBUOY =	21.95	CHP =	1107.0088	DX =	20.3641	V1 =	.00
H =	18.81	VBUOY =	25.87	CHP =	1119.6075	DX =	12.5987	V1 =	.00
H =	27.09	VBUOY =	29.79	CHP =	1128.3348	DX =	8.7273	V1 =	.00
H =	36.54	VBUOY =	33.71	CHP =	1134.7883	DX =	6.4535	V1 =	.00
H =	47.16	VBUOY =	37.63	CHP =	1139.7739	DX =	4.9856	V1 =	.00
H =	58.92	VBUOY =	41.55	CHP =	1143.7195	DX =	3.9456	V1 =	.00
H =	71.88	VBUOY =	45.47	CHP =	1146.9765	DX =	3.2570	V1 =	.00
H =	85.98	VBUOY =	49.39	CHP =	1149.6710	DX =	2.6945	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	2.3005	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00

H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	101.28	VBUOY =	53.31	CHP =	1151.9715	DX =	.0000	V1 =	.00
H =	117.78	VBUOY =	57.23	CHP =	1153.9563	DX =	1.9848	V1 =	.00
H =	135.30	VBUOY =	61.15	CHP =	1155.6256	DX =	1.6693	V1 =	.00
H =	154.20	VBUOY =	65.07	CHP =	1157.1540	DX =	1.5284	V1 =	.00
H =	174.00	VBUOY =	68.99	CHP =	1158.4359	DX =	1.2819	V1 =	.00
H =	195.30	VBUOY =	72.91	CHP =	1159.6493	DX =	1.2134	V1 =	.00
H =	217.50	VBUOY =	76.83	CHP =	1160.6851	DX =	1.0358	V1 =	.00
H =	240.90	VBUOY =	80.75	CHP =	1161.6257	DX =	.9406	V1 =	.00
H =	265.50	VBUOY =	84.67	CHP =	1162.4828	DX =	.8571	V1 =	.00
H =	291.30	VBUOY =	88.59	CHP =	1163.2684	DX =	.7856	V1 =	.00
H =	318.30	VBUOY =	92.51	CHP =	1163.9878	DX =	.7194	V1 =	.00

H=0 DELTA=3 VPCC=167 WW=0 W(1)=.0789 TOL=.1
W(3)=.0784 W(5)=.0787 A1=180 A2=500 A3=500

LOAD DATA

H =	1.32	VBUOY =	14.11	CHP =	1051.5999	DX =	.10515999E 04	V1 =	.00
H =	6.21	VBUOY =	18.03	CHP =	1091.5901	DX =	39.9902	V1 =	.00
H =	12.30	VBUOY =	21.95	CHP =	1110.6993	DX =	19.1092	V1 =	.00
H =	19.59	VBUOY =	25.87	CHP =	1122.6092	DX =	11.9099	V1 =	.00
H =	28.08	VBUOY =	29.79	CHP =	1130.8836	DX =	8.2744	V1 =	.00

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / ERDL	SHEET NO: 3
SUBJECT: MONO - MOORING SYSTEM	
DRAWING NUMBER: JOB 55017 — COMPUTER: ANDREWS — CHECKED BY:	DATE: 3/22/65

CONSIDER TWO UPPER COMPARTMENTS FILLED WITH FOAM.

ADDED VOL. OF FOAM $\approx \frac{650(7.5)}{2} = 2,440$ C.F

WT. OF FOAM = 2,440(.0025) = 6.1^{k}

TOTAL WT $\approx$ 423.6 + 6.1 = 429.7^{k}

4230
2440
6670

TOTAL VOL. OF FOAM $\approx$ 4,230 + 2440 = 6,670 cf

BUOYANT FORCE $\approx$ 6,670(.064) = 427.0^{k}

429.7 $\approx$ 427 BUOYANCY CAN BE FULLFILLED BY FILLING BOTTOM COMPARTMETS & TWO OF TOP COMPARTMENTS WITH FOAM.

19
2
16

DETERMINE MAX. HEEL ∡ OF BUOY FOR 150' W.D.

R1 = 15.	FH = 300.	FV = 0.
R2 = 17.	H1 = 195.	V1 = 72.
R3 = 13.	H2 = 85.	V2 = 43.4
W = 200.	H3 = 5.	V3 = 20.0
C = 6.5	H4 = 7.	V4 = 21.0
D = 14.		V5 = 29.0
E = 16.		
BK = 6.	FORMAT (8F10.4)	

195
120
315

11.3

MAX. HEEL ∡ = 6.15° (FROM COMPUTER)

CHECK BUOY SIZE FOR 60' W.D.

MSL = 60'   TIDE = 20'   MAX. WAVE HT. = 20'   BUOY WT. = 200^K

VERTICAL REACTION FROM PRELOAD ≃ 80^K

FREE FLOATING DRAFT = 4.8'
PRE LOAD DRAFT = $\frac{80}{41.6}$ = 1.9
MOORING LOAD DRAFT = 2.0
TOTAL = 8.7 USE 9'

VERTICAL PROJECTION OF CATENARY = 60+10+13.3 - 2.5 = 80.8'

MIN. VERTICAL PROJECTION OF CATENARY = 60-10-2.5 = 47.5'

COMPUTER INPUT FOR 80.8' VERTICAL PROJECTION

H = 0.
DELTA = 3.
VPCC = 80.8
WN = 0.
W(1) = .0784
TOL = .1
W(3) = .0784
W(5) = .0784
A1 = 90.
A2 = 300.
A3 = 400.

FORMAT (6F8.2)

COMPUTER INPUT FOR 47.5' VERTICAL PROJECTION

H = 0.
DELTA = 3.0
VPCC. = 47.5
WN = 0.
W(1) = .0784
TOL = .1
W(3) = .0784
W(5) = .0784
A1 = 90.
A2 = 300.
A3 = 400.

2

3/23/65

U.S. ARMY / ERDL MONO-MOORING SYSTEM

COMPUTER RESULTS (SEE PG. 3 DATED 3/22/65 FOR INPUT)

LOAD DATA B = 486.8000 DEG = 6.146639

J. RAY McDERMOTT & CO., INC.

ENGINEERS AND GENERAL CONTRACTORS

NEW ORLEANS, LOUISIANA

U.S. ARMY/EROL MONO-MOORING SYSTEM 3/23/65

COMPUTER RESULTS 137.5 VPCC (SEE RESULTS OF 168' FOR INPUT)

LOAD DATA

H =	4.17	VBUOY =	14.11	CHP =	1102.8354	DX =	.11028354E 04	V1 =	
H =	10.14	VBUOY =	18.03	CHP =	1123.2925	DX =	20.4571	V1 =	.00
H =	17.58	VBUOY =	21.95	CHP =	1134.7234	DX =	11.4309	V1 =	.00
H =	26.46	VBUOY =	25.87	CHP =	1142.1307	DX =	7.4073	V1 =	.00
H =	36.78	VBUOY =	29.79	CHP =	1147.3750	DX =	5.2443	V1 =	.00
H =	48.60	VBUOY =	33.71	CHP =	1151.3634	DX =	3.9884	V1 =	.00
H =	61.83	VBUOY =	37.63	CHP =	1154.4319	DX =	3.0685	V1 =	.00
H =	76.56	VBUOY =	41.55	CHP =	1156.9241	DX =	2.4922	V1 =	.00
H =	92.76	VBUOY =	45.47	CHP =	1158.9729	DX =	2.0488	V1 =	.00
H =	110.46	VBUOY =	49.39	CHP =	1160.6968	DX =	1.7239	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	1.3993	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	.0000	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	.0000	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	.0000	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	.0000	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	.0000	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	.0000	V1 =	.00
H =	129.39	VBUOY =	53.31	CHP =	1162.0961	DX =	.0000	V1 =	.00

H = 129.39	VBUOY = 53.31	CHP = 1162.0961	DX = .0000	V1 = .00
H = 129.39	VBUOY = 53.31	CHP = 1162.0961	DX = .0000	V1 = .00
H = 129.39	VBUOY = 53.31	CHP = 1162.0961	DX = .0000	V1 = .00
H = 150.09	VBUOY = 57.23	CHP = 1163.3753	DX = 1.2792	V1 = .00
H = 171.99	VBUOY = 61.15	CHP = 1164.4354	DX = 1.0601	V1 = .00
H = 195.39	VBUOY = 65.07	CHP = 1165.3757	DX = .9403	V1 = .00
H = 220.29	VBUOY = 68.99	CHP = 1166.2133	DX = .8376	V1 = .00
H = 246.69	VBUOY = 72.91	CHP = 1166.9652	DX = .7519	V1 = .00

U.S. ARMY/ERDL MONO-MOORING SYSTEM 3/23/65

COMPUTER RESULTS 30.8' VPCC (SEE PG. 3 DATED 3/22/65)

LOAD DATA

T	X	Y
.70963844E 01	.28249685E 02	.90515107E 02
.75600000E 00	.00000000E-50	.96428571E 01
.75600000E 00	.00000000E-50	.96428571E 01
.75600000E 00	.00000000E-50	.96428571E 01
.75600000E 00	.00000000E-50	.96428571E 01
.75600000E 00	.00000000E-50	.96428571E 01

H =	.75	VBUOY =	7.05	CHP =	728.2496	DX =	.72824969E 03	V1 =	.
H =	3.81	VBUOY =	9.40	CHP =	749.5474	DX =	21.2977	V1 =	.00
H =	7.74	VBUOY =	11.75	CHP =	759.0372	DX =	9.4898	V1 =	.00
H =	12.54	VBUOY =	14.11	CHP =	764.7351	DX =	5.6978	V1 =	.00
	22.99				770.7				
H =	18.24	VBUOY =	16.46	CHP =	768.6508	DX =	3.9157	V1 =	.00
H =	24.75	VBUOY =	18.81	CHP =	771.4065	DX =	2.7556	V1 =	.00
H =	32.16	VBUOY =	21.16	CHP =	773.5499	DX =	2.1434	V1 =	.00
H =	40.44	VBUOY =	23.52	CHP =	775.2425	DX =	1.6926	V1 =	.00
H =	49.62	VBUOY =	25.87	CHP =	776.6293	DX =	1.3867	V1 =	.00
H =	59.64	VBUOY =	28.22	CHP =	777.7621	DX =	1.1327	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.9543	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00

H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	70.53	VBUOY =	30.57	CHP =	778.7164	DX =	.0000	V1 =	.00
H =	86.43	VBUOY =	33.71	CHP =	779.7831	DX =	1.0667	V1 =	.00
H =	104.13	VBUOY =	36.84	CHP =	780.7063	DX =	.9232	V1 =	.00
H =	123.03	VBUOY =	39.98	CHP =	781.4244	DX =	.7180	V1 =	.00
H =	143.43	VBUOY =	43.11	CHP =	782.0356	DX =	.6112	V1 =	.00
H =	165.63	VBUOY =	46.25	CHP =	782.5885	DX =	.5529	V1 =	.00
H =	189.33	VBUOY =	49.39	CHP =	783.0643	DX =	.4758	V1 =	.00
H =	214.53	VBUOY =	52.52	CHP =	783.4799	DX =	.4156	V1 =	.00
H =	241.53	VBUOY =	55.66	CHP =	783.8596	DX =	.3797	V1 =	.00
H =	269.43	VBUOY =	58.80	CHP =	784.1708	DX =	.3112	V1 =	.00

J. RAY McDERMOTT & CO., INC.
ENGINEERS AND GENERAL CONTRACTORS
NEW ORLEANS, LOUISIANA

U.S. ARMY/ERDL MONO-MOORING SYSTEM 3/23/65
VPCC = 57.5' (SEE PG. 4 DATED 3/23/65)

LOAD DATA

H =	3.27	VBUOY =	7.05	CHP =	763.0666	DX =	.76306667E 03	V1 =	
H =	7.56	VBUOY =	9.40	CHP =	770.6827	DX =	7.6161	V1 =	.00
H =	13.08	VBUOY =	11.75	CHP =	774.8349	DX =	4.1521	V1 =	.00
H =	19.80	VBUOY =	14.11	CHP =	777.4569	DX =	2.6220	V1 =	.00
H =	27.78	VBUOY =	16.46	CHP =	779.3206	DX =	1.8637	V1 =	.00
H =	37.08	VBUOY =	18.81	CHP =	780.7375	DX =	1.4169	V1 =	.00
H =	47.37	VBUOY =	21.16	CHP =	781.7367	DX =	.9992	V1 =	.00
H =	59.07	VBUOY =	23.52	CHP =	782.5901	DX =	.8534	V1 =	.00
H =	71.97	VBUOY =	25.87	CHP =	783.2764	DX =	.6862	V1 =	.00
H =	86.07	VBUOY =	28.22	CHP =	783.8414	DX =	.5650	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.4745	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00

J. RAY McDERMOTT & CO., INC.
ENGINEERS AND GENERAL CONTRACTORS
NEW ORLEANS, LOUISIANA

H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	101.37	VBUOY =	30.57	CHP =	784.3159	DX =	.0000	V1 =	.00
H =	123.87	VBUOY =	33.71	CHP =	784.8604	DX =	.5445	V1 =	.00
H =	148.17	VBUOY =	36.84	CHP =	785.2845	DX =	.4241	V1 =	.00
H =	175.17	VBUOY =	39.98	CHP =	785.6715	DX =	.3869	V1 =	.00
H =	203.67	VBUOY =	43.11	CHP =	785.9711	DX =	.2996	V1 =	.00
H =	234.87	VBUOY =	46.25	CHP =	786.2499	DX =	.2788	V1 =	.00
H =	267.87	VBUOY =	49.39	CHP =	786.4825	DX =	.2326	V1 =	.00

U.S. ARMY / ERDL MONO-MOORING SYSTEM 3/23/65

COMPUTER RESULTS 47.5' VPCC (SEE PG. 3 DATED 3/22/65)

LOAD DATA

H =	4.83	VBUOY =	7.05	CHP =	772.2565	DX =	.77225654E 03	V1 =	
H =	10.02	VBUOY =	9.40	CHP =	777.0400	DX =	4.7835	V1 =	.00
H =	16.68	VBUOY =	11.75	CHP =	779.7348	DX =	2.6948	V1 =	.00
H =	24.84	VBUOY =	14.11	CHP =	781.5014	DX =	1.7666	V1 =	.00
H =	34.47	VBUOY =	16.46	CHP =	782.7385	DX =	1.2370	V1 =	.00
H =	45.57	VBUOY =	18.81	CHP =	783.6559	DX =	.9174	V1 =	.00
H =	58.17	VBUOY =	21.16	CHP =	784.3701	DX =	.7142	V1 =	.00
H =	72.27	VBUOY =	23.52	CHP =	784.9415	DX =	.5714	V1 =	.00
H =	87.87	VBUOY =	25.87	CHP =	785.4036	DX =	.4670	V1 =	.00
H =	104.97	VBUOY =	28.22	CHP =	785.7973	DX =	.3887	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.3281	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00

H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	123.57	VBUOY =	30.57	CHP =	786.1255	DX =	.0000	V1 =	.00
H =	150.57	VBUOY =	33.71	CHP =	786.4853	DX =	.3598	V1 =	.00
H =	180.57	VBUOY =	36.84	CHP =	786.7967	DX =	.3113	V1 =	.00
H =	212.37	VBUOY =	39.98	CHP =	787.0338	DX =	.2370	V1 =	.00
H =	247.47	VBUOY =	43.11	CHP =	787.2531	DX =	.2193	V1 =	.00
H =	284.97	VBUOY =	46.25	CHP =	787.4382	DX =	.1851	V1 =	.00

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY McDERMOTT & Co., INC.

COMPANY			SHEET NO.
U. S. ARMY / ERDL			1
SUBJECT: MONO-MOORING SYSTEM			
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		3/12/65

SIZE BUOY FOR MAXIMUM W.D.

MSL = 150' TIDE = 20' MAX. WAVE HT = 20'

WT. OF BUOY ≈ 100^T

VERTICAL REACTION FROM PRELOAD ≈ 200^K

TRY 30' φ BUOY WITH 8½' φ WELL

BUOYANCY/FT. $= (.785(30)^2 - .785(8.5)^2)64$

$= 41.6\ ^K/_1$

DRAFT FLOATING FREE $= \frac{200}{41.6} = 4.8'$

DRAFT UNDER PRELOAD $= \frac{200}{41.6} = 4.8'$

ADDITIONAL DRAFT WITH MOORING LOAD APPLIED ≈ 2'

TOTAL DRAFT ≈ 11.6' USE 12'

DISTANCE FROM BOTTOM OF BUOY TO CHAIN ATTACHMENT = (

12
6.0
5.6 VERTICAL PROJECTION OF CATENARY ≈ 150 + 10 + 13.3 - 5.5 = 1

USE 16

73.3
5.5
167.8

ACTUAL DRAFT UNDER PRE-LOAD

TOTAL $V \approx 28.8(8) = \underline{230}^{K}$

FIND VERTICAL UNDER MOORING LOAD

$V = 28.8(2) + 72.9 + 2(50) + 20 + 2(20.5) = 291.5^{K}$

TOTAL DRAFT $= \frac{491.5}{41.6} = \underline{11.8'} \approx \underline{12' \text{ O.K.}}$

DETERMINE TOTAL VERTICAL ON BUOY WHEN DECK IS 2" OUT OF WATER.

ASSUME DEPTH FROM TOP OF DECK TO BOTTOM OF BUOY = 16'

VERTICAL PROJECTION OF CATENARY $= 150 + 10 + 13.3 - 9.5 = 163.8'$

USE 164'

SINCE CHP MUST REMAIN, PICK OFF VBUOY CORRESPONDING TO CHP = 1125

$V1 = 26.6^{K}/\text{LEG}$ TOTAL $V1 = 26.6(8) = \underline{213}^{K}$

DETERMINE TOTAL WT.

VOLUME OF FOAM $\approx 650(6.5) = 4230$ cf

WT. OF FOAM $= 4,230(.0025) = \underline{10.6}^{K}$

TOTAL WT $= 200 + 213 + 10.6 = \underline{423.6}^{K}$

DRAFT $= \frac{423.6}{41.6} = \underline{10.2'} > 6.5'$ NO GOOD

TOTAL WT. WHICH FOAM CAN SUPPORT

$W = 4,230(.064) = \underline{270}^{K}$ $270 - 10.6 - 200 = \underline{59.4}^{K}$

59.4^{K} = WT. OF CHAIN

USE 12'

DRAFT = 6.5'

$- 9.5 = 167.8'$

USE 168'

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 1

COMPANY U.S. ARMY / ERDL

SUBJECT MONO-MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY ________ DATE 6-17 1965

CHECK BUOY FOR MAX. W.D.

MSL = 150' TIDE = 20 MAX. WAVE HT. = 20

WT. OF BUOY = 103T VERTICAL REACTION = 230^k

206
230
.3
279

EQUIPMENT, PIPING & FUEL --- 63^k

TOTAL VERTICAL UNDER PRELOAD = 206 + 230 + 63 = 499^k

BUOYANCY FROM SKIRT = $[.785(40)^2 - .785(30)^2](1)(64)$ = 35^k

NET WT. = 499 - 35 = 465^k

DRAFT = $\frac{465}{41.6}$ = 11.2' USE 12'

VERTICAL CHAIN LOAD UNDER MOORING LOAD

V_c = 291.5^k

TOTAL V = 291.5 + 206 + 63 + -35 = 525.5^k

MAX. DRAFT = $\frac{525.5}{41.6}$ = 12.6^k

FREEBOARD TO TOP OF DECK = 16.5 - 12.6 = 3.9'

ADD 6" TO DEPTH OF BUOY TO ALLOW FOR ANY ADDED WT.

SECTION II

BUOY DESIGN

COMPUTATION SHEET
ENGINEERING DEPARTMENT
MCD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

CHECK OF POSITIVE FREEBOARD
FOR VARIOUS WATER DEPTHS.

ALSO

CALCULATIONS ON FREEBOARD TO
TOP OF BUOY HULL FOR VARIOUS
WATER DEPTHS. (NORMAL W.O. &
NORMAL PRE-LOAD)

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET — SHEET NO. 1

COMPANY: U.S. ARMY / ERDL

SUBJECT: MONO-MOORING SYSTEM

JOB / DRAWING NO. 56017 — COMPUTER: ANDREWS — CHKD. BY: — DATE: 10/1/65 (6-30-1965)

CHECK POSITIVE FREEBOARD FOR VARIOUS W.D.

50 FOOT WATER DEPTH (TWO COMPARTMENTS FLOODED)

TOTAL BUOYANCY ≈
20.8(8) = 166
31.2(7) = 218
SKIRT = 40.2
≈ 424.2

VOLUME OF FOAM ≈ 384 / .064 = 6,000 cf WT = 4.0 (6.0) = 24.0

TOTAL WT. ≈ 290 + 56.4 + 24 = 370.4 < 424.2

∴ BUOY WILL HAVE POSITIVE FBD.

60 FOOT WATER DEPTH (TWO COMPTS. FLOODED)

TOTAL BUOYANCY ≈ 31.2(7) = 218
20.8(8) = 166
SKIRT = 40.2
≈ 424.2

VOLUME OF FOAM ≈ 384 / .064 = 6,000 cf WT = 6(2.5) = 15

TOTAL WT. = 290 + 67.2 + 24 = 381.2

424 > 381.2 O.K.

POSITIVE FBD. CALCULATIONS

70 FOOT WATER DEPTH (TWO COMPTS. FLOODED)

TOTAL BUOYANCY ≈ 437.2^k TOTAL WT = 290+80+24 = 394^k

423 > 394 O.K.

80 FOOT WATER DEPTH (TWO COMPTS. FLOODED)

TOTAL BUOYANCY ≈ 428^k TOTAL WT ≈ 290+100+24 = 414^k

428 > 414 O.K.

90 FOOT WATER DEPTH (TWO COMPTS. FLOODED)

B = 428^k WT. = 290+110+24 = 424^k

428 > 424 O.K.

100 FOOT WATER DEPTH

B = 497.2^k (SEE 110' W.D.)

TOTAL WT. = 290+125+23.6 = 443.6

497.2 > 443.6 O.K.

7

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 2

COMPANY U.S. ARMY/ERDL

SUBJECT MONO-MOORING SYSTEM

~~DRAWING~~ JOB NO. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6/30 1965

110 FOOT WATER DEPTH

TOTAL BUOYANCY ≈ 41.6(7) = 291
20.3(8) = 166
SKIRT = 40.2
497.2

VOLUME OF FOAM ≈ $\frac{457}{.064}$ = 7,150 c.f. WT = 7.15(4.0) = 28.6

TOTAL WT. = 290+144+28.6 = 462.6

497.2 > 462.6 O.K.

120 FOOT WATER DEPTH

B = 497.2 WT. = 290+154+28.6 = 477.6

497.2 > 477.6 O.K.

130 FOOT WATER DEPTH

B = 497.2 WT. = 290+173+28.6 = 491.6

497.2 > 491.6 O.K.

140 FOOT WATER DEPTH

B = 497.2 WT. = 290+184+28.6 = 502.6

502.6 > 497.2 APPROX. DECREASE IN VERTICAL

502.6 − 16 = 486.6 DUE TO DEPOSITING CHAIN ON BOTTOM

497.2 > 486.6 O.K. SEE PG. 1 OF ANCHOR SYSTEM CALCULATIONS DATED 3/12/61 DECREASE ≈ 16

5177

POSITIVE FBD CALCULATIONS

150 FOOT WATER DEPTH

$B = 497.2^k$ $WT = 290 + 187 + 23.6 = 502.6^k$

$502.6 > 497.2$

ESTIMATE REDUCTION IN VERTICAL CHAIN REACTION WITH INCREASE IN DRAFT.

SEE SHT. 1 OF ANCHOR SYSTEM CALCULATIONS DATED: 3/12/65

APPROX. REDUCTION $= \frac{5.25}{4}(2) = 2.62^k$/LEG $= 8(2.62) = \underline{21}^k$

NOTE: BODY CONTAINS APPROX. 105^k OF STRUCTURAL STEEL WITH A SUBMERGED WT. $\simeq 91^k$ WHICH HAS BEEN FIGURED IN THE BUOYANCY OF 497.2^k.

REDUCTION IN TOTAL WT. $= 105 - 91 + 21 = \underline{35.0}^k$

TOTAL IN WATER WT. $= 502.6 - 35.0 = \underline{467.6}$

$497.2 > 467.6^k$ O.K.

(42)

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO.
U.S. ARMY/ERDL	1
SUBJECT: MONO-MOORING SYSTEM	

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		10/1/65

WT. OF BUOY PLUS EQPT. = $\underline{290^k}$

WT. OF FOAM

TWO COMPTS. FLOODED = 6,000(4) = $\underline{24^k}$

NO " " = 7,150(4) = $\underline{28.6^k}$

DETERMINE BUOYANCY OF SKIRT

$B = [.785(40.17)^2 - (8)^2(.785)]\frac{11.33}{12}(64) = \underline{34^k}$

BUOYANCY OF RUBBER BUMPER

$B = [.785(42)^2 - (40.17)^2(.785)]\frac{10}{12}(64) = \underline{6.2^k}$

1384 1267

50 FOOT WATER DEPTH

VERTICAL FROM PRELOAD = 7.05(8) = $\underline{56.4^k}$

TOTAL V = 290 + 28.6 - 34 - 6.2 + 56.4

DRAFT = $\frac{334.8}{41.6}$ = $\underline{8.04'}$

290
28.6
318.6
34
284.6
6.2
278.4
56.4
334.8

CONSIDER TWO COMPTS. FLOODED

$F_D = 41.6(.75) = \underline{31.2}$

$31.2(7) = \underline{218^k}$

$334.8 - 218 = \underline{116}$

$D' = \frac{116}{41.6} = \underline{2.78'}$

34
18
116

TOTAL D = 7 + 2.78 = $\underline{9.78}$

FBD = 15 - 9.78 = $\underline{5.22'}$

60 FOOT WATE[R]

$V_{PL} = 8.4(8) = \underline{67}$[...]

TOTAL V = 290 + 6[...]

DRAFT = $\frac{345.6}{41.6}$ = [...]

FBD. = 15 - 8.3 = [...]

CONSIDER TWO C[OMPTS.]

$F_D = 31.2$ 345.[...]

$D' = \frac{127.6}{41.6} = \underline{3.1'}$

DRAFT = 10.1' F[...]

70 FOOT WATER [DEPTH]

$V_{PL} = 10(8) = \underline{80^k}$

TOTAL V = 290 + 8[...]

DRAFT = $\frac{353.9}{41.6}$ = [...]

TWO COMPTS. F[LOODED]

$F_D = \underline{31.2}$ 358[...]

$D' = \frac{135.8}{41.6} = \underline{3.26'}$

DRAFT = $\underline{10.26'}$

1

CHECK DRAFT OF BUOY FOR VARIOUS WATER DEPTHS

...T WATER DEPTH

(8) = 67.2^k

= 290 + 67.2 + 28.6 − 40.2 = 375.6

$\frac{375.6}{41.6}$ = 8.30

5 − 8.3 = 6.7'

TWO COMPTS. FLOODED

375.6 − 218 = 127.6

... = 3.1'

10.1' FBD. = 4.9'

WATER DEPTH

) = 80^k

= 290 + 80 + 28.6 − 40.2 = 358.4

$\frac{358.4}{41.6}$ = 8.6' FBD = 6.4'

...MPTS. FLOODED

358.4 − 218 − 4.6 = 135.8

... = 3.26'

...26' FBD. = 1.74'

80 FOOT WATER DEPTH

V_{PL} = 12.5(8) = 100^k

TOTAL V = 290 + 100 + 28.6 − 40.2 = 378.4

DRAFT = $\frac{378.4}{41.6}$ = 9.1' FBD. = 5.9

TWO COMPTS. FLOODED

378.4 − 218 − 4.6 = 155.8

D' = $\frac{155.8}{41.6}$ = 3.75'

FBD. = 15 − 10.75 = 4.25'

90 FOOT WATER DEPTH

V_{PL} = 13.8(8) = 110^k

TOTAL V = 290 + 110 + 28.6 − 40.2 = 388.4

DRAFT = $\frac{388.4}{41.6}$ = 9.34'

FBD. = 15 − 9.34 = 5.66'

CONSIDER TWO COMPTS. FLOODED

388.4 − 218 − 4.6 = 165.8

D' = $\frac{165.8}{41.6}$ = 3.99

FBD. = 15 − 10.99 = 4.01'

7

ENGINEERING DEPARTMENT
COMPUTATION SHEET

J. RAY McDERMOTT & CO., INC.

McD 5036

COMPANY			SHEET NO 2
SUBJECT			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE

100 FOOT WATER DEPTH

$V_{PL} = 15.7(8) = \underline{125^k}$

$TOTAL\ V = 290 + 125 + 28.6 - 40.2 = \underline{403.4}$

$DRAFT = \frac{403.4}{41.6} = 9.70 \quad FBD. = \underline{5.3'}$

110 FOOT WATER DEPTH

$V_{PL} = 18(8) = \underline{144^k}$

$TOTAL\ V = 290 + 144 + 28.6 - 40.2 = \underline{422.4}$

$DRAFT = \frac{422.4}{41.6} = \underline{10.15'} \quad FBD. = \underline{4.85'}$

120 FOOT WATER DEPTH

$V_{PL} = 19.8(8) = \underline{159^k}$

$TOTAL\ V = 290 + 159 + 28.6 - 40.2 = \underline{437.4}$

$DRAFT = \frac{437.4}{41.6} = \underline{10.5'} \quad FBD. = \underline{4.49'}$

130 FOOT WATER DEPTH

$V_{PL} = 21.6(8) = \underline{173^k}$

$TOTAL\ V = 290 + 173 + 28.6 - 40.2 = \underline{451.4}$

$DRAFT = \frac{451.4}{41.6} = \underline{10.85'}$

$FBD. = \underline{4.15'}$

140 FOOT WATE

$V_{PL} = 23.8(8) = \underline{190^k}$

$DRAFT = \frac{462.4}{41.6} = $

150 FOOT WATER

$V_{PL} = 25.4(8) = \underline{203}$

$DRAFT = \frac{462.7}{41.6} = \underline{11.1}$

INC.

SHEET NO 2

DATE

140 FOOT WATER DEPTH

$V_{PL} = 23.8(8) = \underline{190}^k$ TOTAL $V = 290 + 184 + 28.6 - 40.2 = \underline{462.4}$

DRAFT $= \dfrac{462.4}{41.6} = \underline{11.12'}$ FBD. $= \underline{3.88'}$

150 FOOT WATER DEPTH

$V_{PL} = 25.4(8) = \underline{203}^k$ TOTAL $V = 290 + 184 + 28.6 - 40.2 = \underline{462.4}$

DRAFT $= \dfrac{462.4}{41.6} = \underline{11.12'}$ FBD. $= \underline{3.88}$

COMPUTATION SHEET
ENGINEERING DEPARTMENT
McD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

VOID DRAFT
CALCULATIONS

271
62.2
333.2

307.2
213
362

J. RAY McDERMOTT & CO., INC.
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET No. 1

COMPANY U.S. ARMY/EROL

SUBJECT MONO-MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY DATE 6-28 1965

CHECK DRAFT OF BUOY FOR VARIOUS WATER DEPTHS

WEIGHT OF BUOY = $\underline{206^k}$ EQUIPMENT, PIPING & FUEL -- $\underline{65^k}$

206
65
271

FREE FLOATING DRAFT = $\frac{271}{41.6} = \underline{6.5'}$

10/11/65
WT OF BUOY INCREASE FROM 271^k TO 290^k ; INCREASE IN DRAFT = $\frac{19}{41.6} = \boxed{.45'}$

DETERMINE BUOYANCY FROM SKIRT

$B = [.785(40.17)^2 - .785(30)^2]\frac{11.38}{12}(67) = \underline{34^k}$

1265
706
559

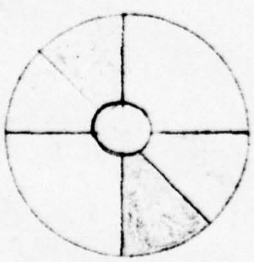
VERTICAL FROM PRE-LOAD $V_{PL} = 7.05(8) = \underline{56.4^k}$

TOTAL $V = 271 + 56.4 - 34 = \underline{293.4^k}$

DRAFT = $\frac{293.4}{41.6} = \underline{7.05'}$

CONSIDER TWO COMPARTMENTS FLOODED

WT. OF FOAM = 15^k
SEE PG. 1 OF CALS ENTITLED "POSITIVE FBD CALS."



$F_D = 41.6(.75) = \underline{31.2^k/_1}$

$31.2(7) = \underline{218^k}$

$293.4 - 218 + 15 = \underline{90.4}$ DRAFT $= \frac{15}{41.6} = \underline{.36}$

204.2
45.6
158.6

$D' = \frac{90.4}{41.6} = \underline{2.17'}$

317
145.6
171.4

TOTAL DRAFT = $7 + 2.17 = \underline{9.17'}$

FBD. = $15 - 9.17 = \underline{5.83'}$

CONSIDER FOUR COMPARTMENTS FLOODED

$F_D = 41.6(.5) = \underline{20.8^k/_1}$ $20.8(7) = \underline{145.6^k}$

$293.4 - 145.6 = \underline{147.8^k}$ $D' = \frac{147.8}{41.6} = \underline{3.55'}$

TOTAL DRAFT = $7 + 3.55 = \underline{10.55}$

FREEBOARD = $15 - 10.55 = \underline{4.45'}$

$$\begin{array}{r} 96 \\ 221 \\ \hline 317 \end{array}$$

60' FOOT WATER DEPTH

$V_{PL} = 8.4(8) = \underline{67.2^k}$ TOTAL $V = 271. + 67.2 - 34 = \underline{304.2}$

$DRAFT = \frac{304.2}{41.6} = \underline{7.32'}$

CONSIDER TWO COMPTS. FLOODED

$F_D = 41.6(.75) = \underline{31.2^k}$ $304.21 - 218 = \underline{86.2}$ $D' = \frac{86.2}{41.6} = \underline{2.08'}$

$DRAFT = 7 + 2.08 = \underline{9.08'}$ $FBD = 15 - 9.08 = \underline{5.92'} - .36' = \underline{5.56'}$

CONSIDER FOUR COMPTS. FLOODED

$F_D = \underline{20.8^k}$ $304.2 - 145.6 = \underline{158.6^k}$ $D' = \frac{158.6}{41.6} = \underline{3.82'}$

$DRAFT = 7 + 3.82 = \underline{10.82'}$ $FBD = 15 - 10.82 = \underline{4.18'}$

70 FOOT WATER DEPTH

$V_{PL} = 10(8) = \underline{80^k}$ TOTAL $V = 271 + 80 - 34 = \underline{317^k}$

$DRAFT = \frac{317}{41.6} = \underline{7.6'}$

CONSIDER TWO COMPTS. FLOODED

$F_D = 31.2^k/$ $317 - 218 = \underline{99^k}$ $D' = \frac{99}{41.6} = \underline{2.38'}$

$DRAFT = 7 + 2.38 = \underline{9.38'}$ $FBD. = 15 - 9.38 = \underline{5.62'} - .36 = \underline{5.26'}$

CONSIDER FOUR COMPTS. FLOODED

$F_D = 20.8^k$ $317 - 145.6 = \underline{171.4^k}$ $D' = \frac{171.4}{41.6} = \underline{4.12'}$

$DRAFT = 7.0 + 4.12 = \underline{11.12}$ $FBD = 15.0 - 11.12 = \underline{3.88'}$

2

J. RAY MCDERMOTT & CO., INC.
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 2

COMPANY U.S. ARMY/ERDL
SUBJECT MONO-MOORING SYSTEM
JOB No. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-28 19 65

371
- 34
= 37

80 FOOT WATER DEPTH

$V_{PL} = 12.5(8) = \underline{100^k}$ TOTAL $V = 271 + 100 - 34 = \underline{337^k}$

DRAFT $= \frac{337}{41.6} = \underline{8.1'}$

CONSIDER TWO COMPTS. FLOODED

$F_D = \underline{31.2}$ $337 - 218 = \underline{119^k}$ $D' = \frac{119}{41.6} = \underline{2.86}$

DRAFT $= 7 + 2.86 = \underline{9.86'}$ FBD $= 15 - 9.86 = \underline{5.14'} - .36 = \underline{4.78'}$

90 FOOT WATER DEPTH

$V_{PL} = 13.8(8) = \underline{110^k}$ TOTAL $V = 271 + 110 - 34 = \underline{347^k}$

DRAFT $= \frac{347}{41.6} = \underline{8.35'}$

CONSIDER TWO COMPTS. FLOODED

$F_D = 31.2$ $347 - 218 = 129^k$ $D' = \frac{129}{41.6} = \underline{3.1'}$

DRAFT $= 7 + 3.1 = \underline{10.1'}$ FBD $= 15 - 10.1 = \underline{4.9'}$ $- .36 = \underline{4.54'}$

9177

SEE PG. 2 OF CALS. ENTITLED "POSITIVE FBD CALS." DATED 6/30/65

WT. OF FOAM ≈ 18^K ADDT. DRAFT = $\frac{18}{41.6}$ = .43'

100 FOOT WATER DEPTH

$V_{OL} = 15.7(8) = \underline{125^{k}}$ TOTAL $V = 271 + 125 - 34 = \underline{362^{k}}$

$DRAFT = \frac{362}{41.6} = \underline{\underline{8.7'}}$ $FBD = 15 - 8.7 = \underline{\underline{6.3'}} - .43 = \underline{\underline{5.87'}}$

CONSIDER TWO COMPTS. FLOODED

$F_D = 31.2$ $362 - 218 = \underline{144}$ $D' = \frac{144}{41.6} = \underline{\underline{3.55'}}$

$DRAFT = 7 + 3.55 = \underline{\underline{10.55'}}$ $FBD = \underline{\underline{4.45'}} - .43 = \underline{\underline{4.02'}}$

110 FOOT WATER DEPTH

$V_{OL} = 18.0(8) = \underline{144^{k}}$ TOTAL $V = 271 + 144 - 34 = \underline{381^{K}}$

$DRAFT = \frac{381}{41.6} = \underline{\underline{9.16'}}$ $FBD = \underline{\underline{5.84'}} - .43 = \underline{\underline{5.41'}}$

CONSIDER TWO COMPTS. FLOODED

$F_D = 31.2$ $381 - 218 = \underline{\underline{163^{k}}}$ $D' = \frac{163}{41.6} = \underline{\underline{3.92'}}$

$DRAFT = 7 + 3.92' = \underline{10.92'}$ $FBD = \underline{\underline{4.08'}}$

2

J. RAY McDERMOTT & Co., INC.
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 3

COMPANY U. S. ARMY / ERDL

SUBJECT MONO - MOORING SYSTEM

JOB DRAWING NO. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-28 1965

120 FOOT WATER DEPTH

$V_{PL} = 19.8(8) = \underline{159^k}$ TOTAL $V = 159+271-34 = \underline{396}$

$DRAFT = \frac{396}{41.6} = \underline{9.5'}$ $FBD = 15-9.5 = \underline{5.5'} - .43 = \underline{5.07'}$

CONSIDER TWO COMPTS. FLOODED

$F_B = \underline{31.2^k/_1}$ $396-218 = \underline{178^k}$ $D' = \frac{178}{41.6} = \underline{4.28'}$

$DRAFT = 7+4.28 = \underline{11.28'}$ $FBD = 15-11.28 = \underline{3.72'}$

130 FOOT WATER DEPTH

$V_{PL} = 21.6(8) = \underline{173^k}$ TOTAL $V = 173+271-34 = \underline{410^k}$

$DRAFT = \frac{410}{41.6} = \underline{9.85'}$ $FBD = \underline{5.15'} - .43 = \underline{4.72'}$

3.35

140 FOOT WATER DEPTH

$V_{PL} = 23.8(8) = \underline{190^k}$ TOTAL $V = 190+271-34 = \underline{427^k}$

$DRAFT = \frac{427}{41.6} = 10.3'$ $FBD = \underline{4.7'} - .43 = \underline{4.27'}$

2.32

150 FOOT WATER DEPTH

$V_{PL} = 25.4(8) = \underline{203^k}$ TOTAL $V = 203+271-34 = \underline{440^k}$

$DRAFT = \frac{440}{41.6} = \underline{10.6'}$ $FBD = \underline{4.4'} - .43 = \underline{3.97}$

2.2'

Margin calculations: 271 / 159 / 430 / 34 / 396; 396 / 8 / 1 8; 271 / 173 / 444 / 34 / 410; 190 / 271 / 461 / 34 / 427; 203 / 271 / 474 / 34 / 440

3177

cDERMOTT & CO., INC.

EPARTMENT - COMPUTATION SHEET SHEET NO. 3

SYSTEM

DREWS CHKD. BY DATE 6-28 1965

EPTH

TOTAL V= 159+271-34 = 396

FBD= 15-9.5 = 5.5' - .43 = 5.07'

FLOODED

=178^k D' = 178/41.6 = 4.28'

' FBD = 15-11.28 = 3.72'

PTH

TOTAL V = 173+271-34 = 410^k

FBD = 5.15' - .43 = 4.72'

3.35

TH

TOTAL V= 190+271-34 = 427^k

FBD= 4.7' - .43 = 4.27'

2.82'

TOTAL V = 203+271-34 = 440^k

FBD = 4.4' - .43 = 3.97

2.2'

COMPUTATION SHEET
ENGINEERING DEPARTMENT
MCD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

A-FRAME CONNECTIONS

MACHINERY BASES

PIPE SUPPORTS

SWIVEL KEY TO ROTATING DECK CONN.

LIFTING EYES

LAUNCHING FORCE

J. RAY McDERMOTT & CO., INC.

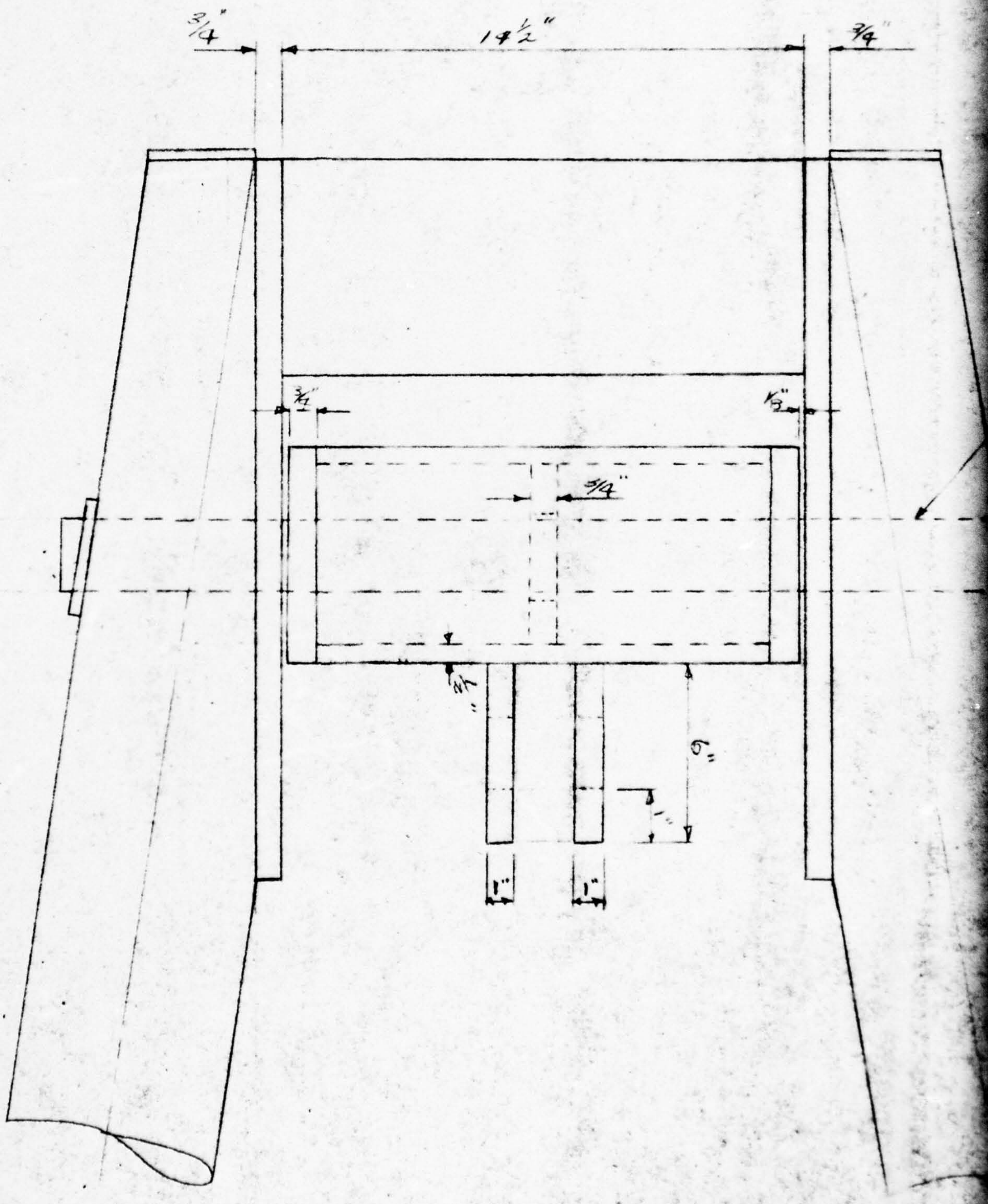
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 1

COMPANY U.S. ARMY / ERDL

SUBJECT MONO-MOORING SYSTEM

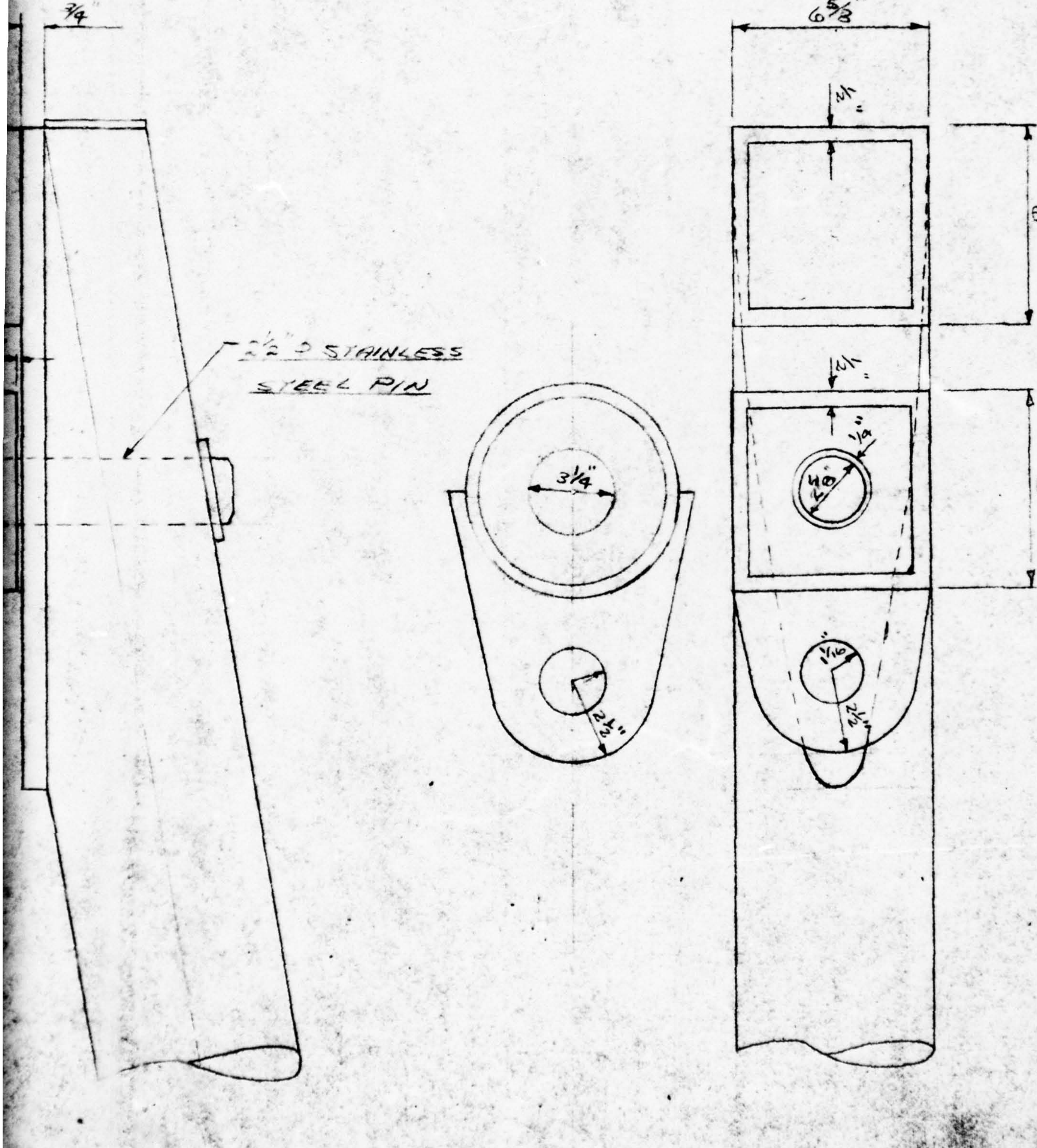
JOB ~~DRAWING~~ NO. 56017 COMPUTER ANDREWS CHKD. BY ____ DATE 6-2 1965



.5(.75)(135) = 5.06 $^{1/4}$"

$\frac{50}{12} = 4.16$

"A" FRAME CONNECTIONS



2

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 2

COMPANY U.S. ARMY / ERDL

SUBJECT MONO - MOORING SYSTEM

JOB NO. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6 - 7 1965

CHECK PEAK CONNECTION

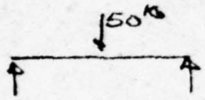
$2\frac{1}{2}$" DIA. PIN

SHEAR $= 147.3^k > 50^k$ O.K.

BEARING $= 80(1.5) = 120^k > 50^k$ O.K.

$M = 25(.875) = 22''^k < 45.9''^k$ O.K.

CHECK BENDING OF 6" ϕ EXTRA STRONG PIPE



$M = \frac{PL}{4} = \frac{50(14)}{4} = 175''^k$

$f = \frac{175(3.32)}{40.5} = 14.3$ ksi

$\Delta \approx \frac{50(1.16)^3}{834(40.5)} = .0023''$

3177

C.
EET SHEET No. 2

DATE 6 - 7 1965

"A" FRAME CONNECTIONS

E

2

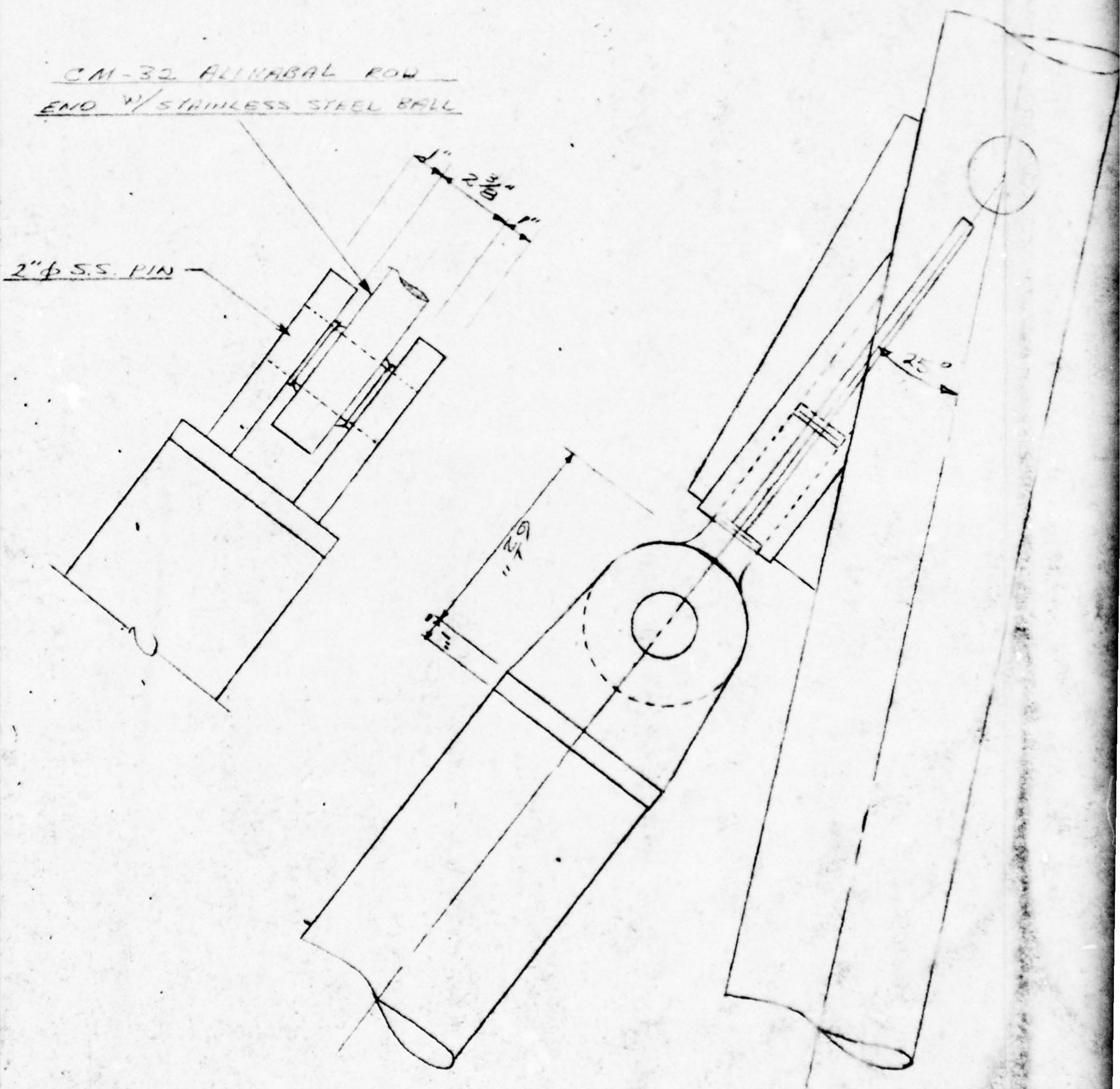
J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET SHEET NO. 3

COMPANY U.S. ARMY / ERDL

SUBJECT MONO - MOORING SYSTEM

DRAWING NO. 56017 COMPUTER ANDREWS CHKD. BY _____ DATE 6 - 3 1965



3

19 65

"A" FRAME CONNECTIONS

2

J. RAY McDERMOTT & CO., INC.

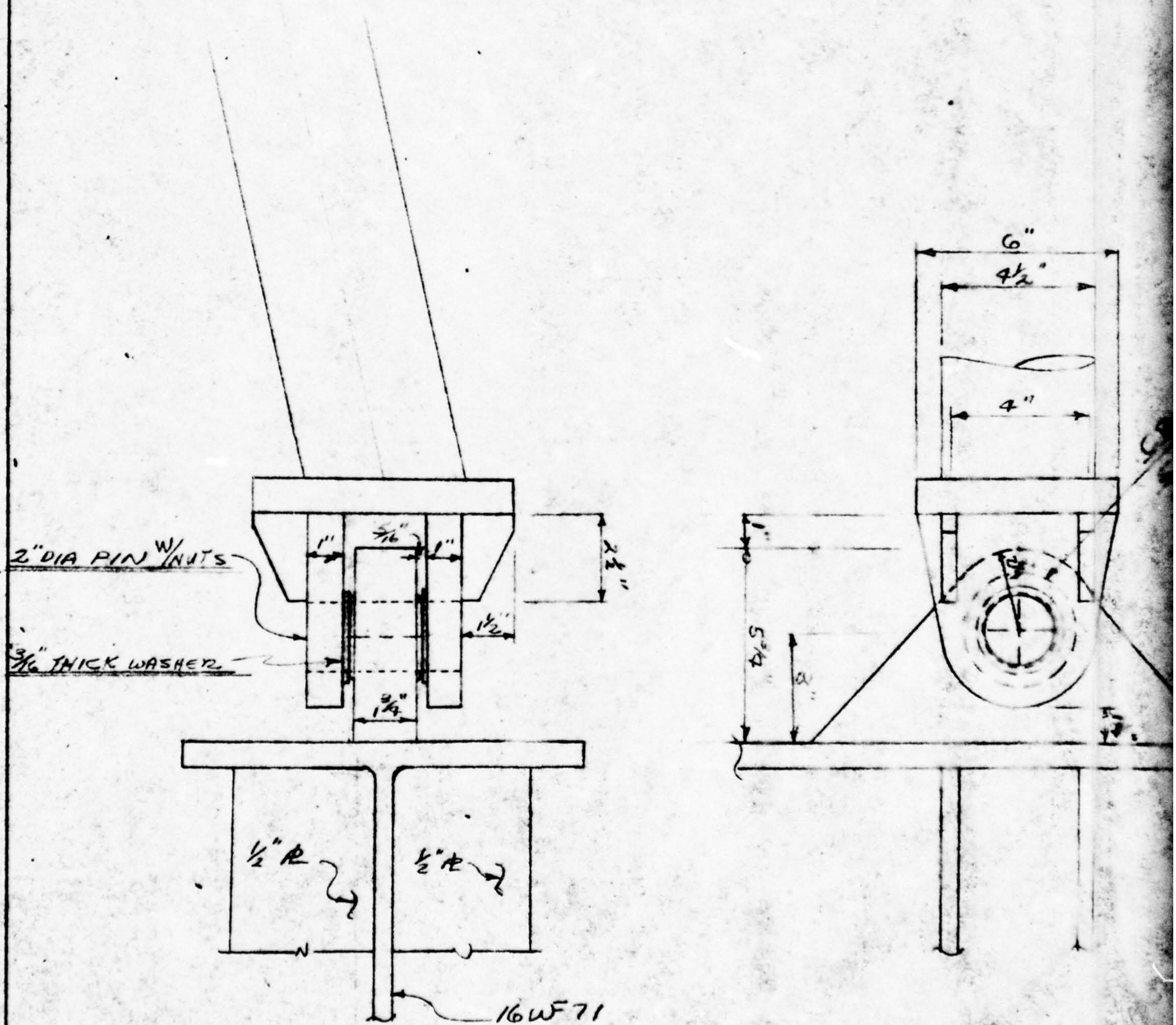
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 4

COMPANY U.S. ARMY / ERDL

SUBJECT MONO - MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6 - 7 1965



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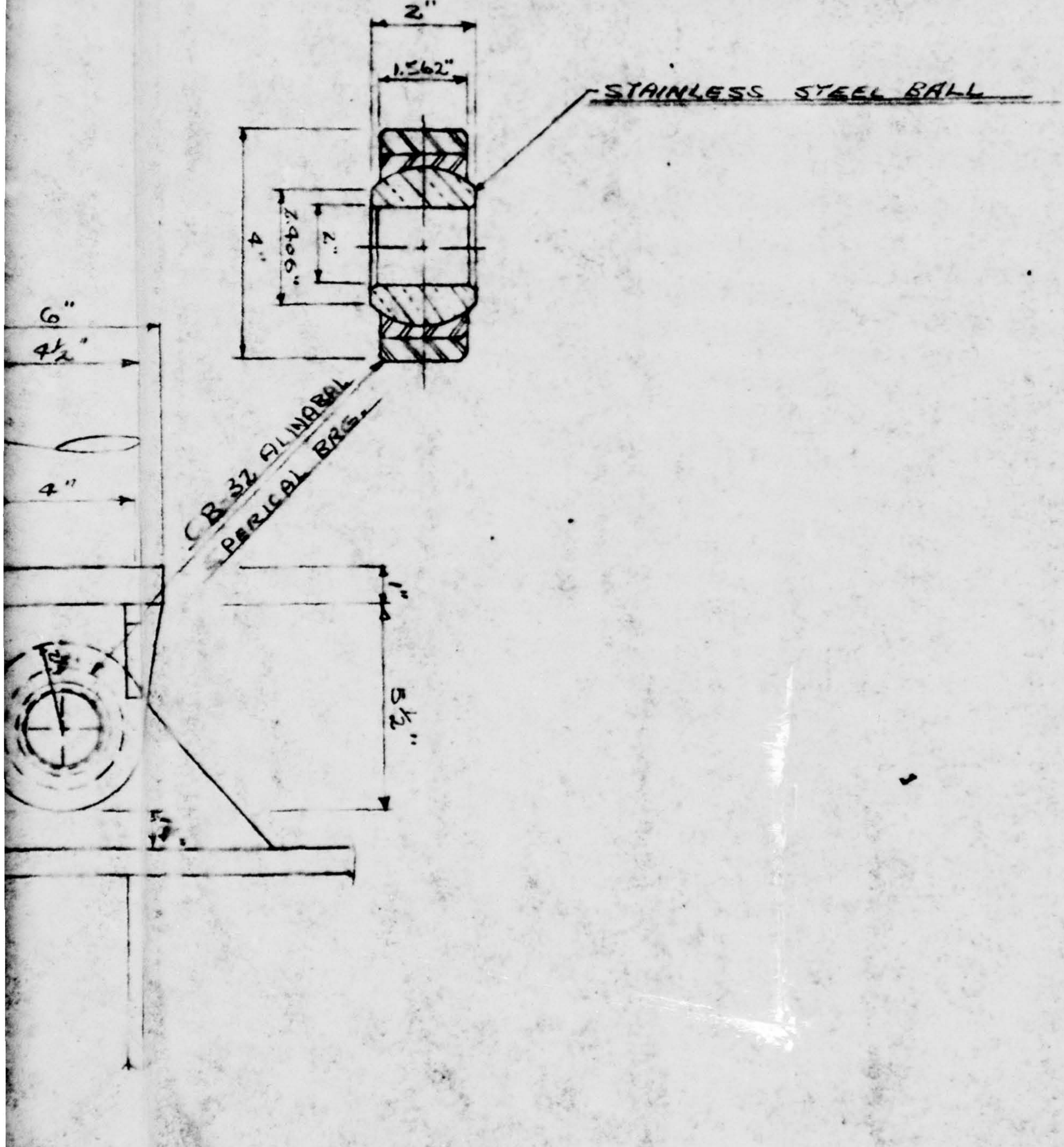
4

10 65

"A" FRAME CONNECTIONS

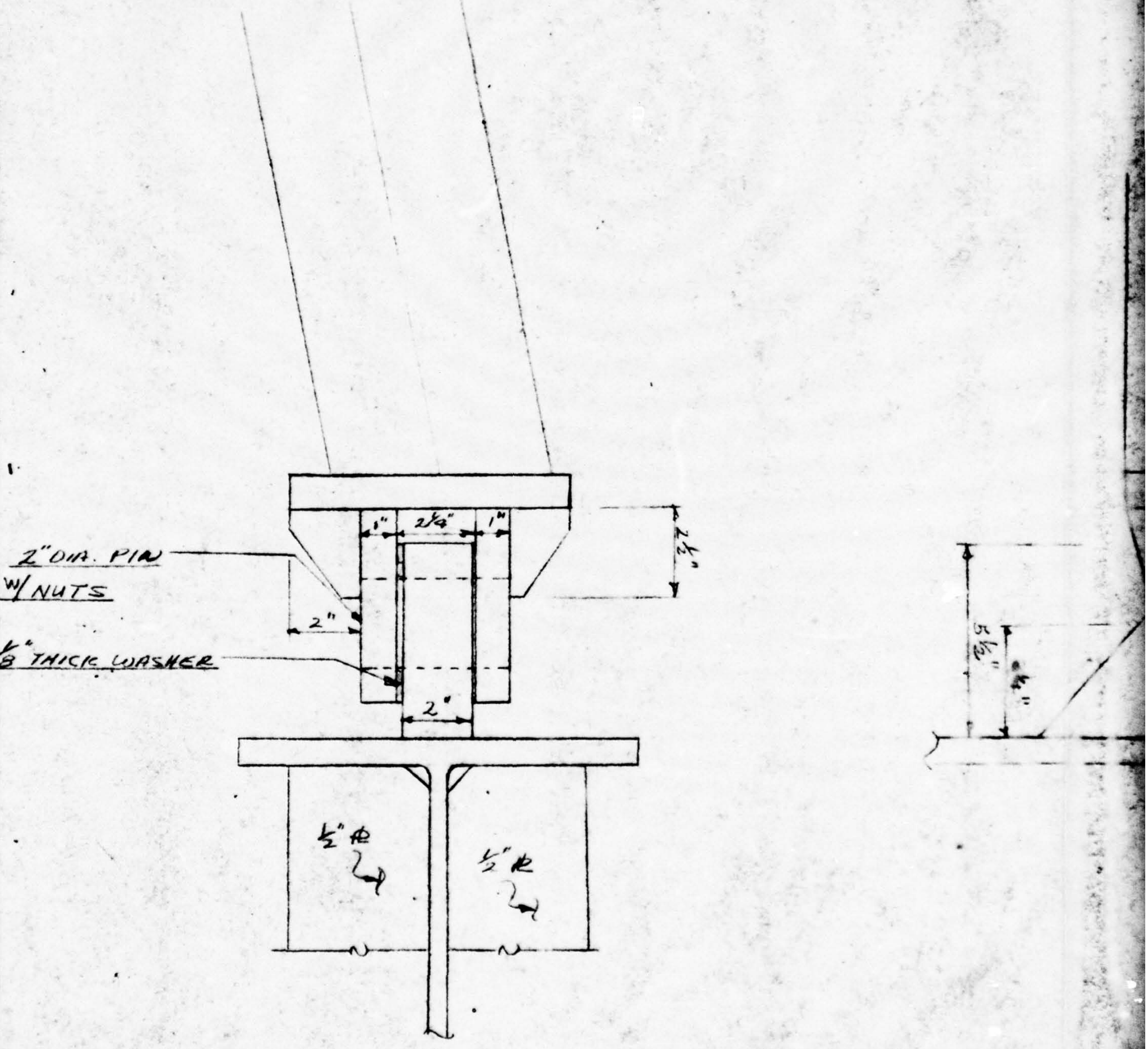


COMPANY U.S. ARMY / ERDL

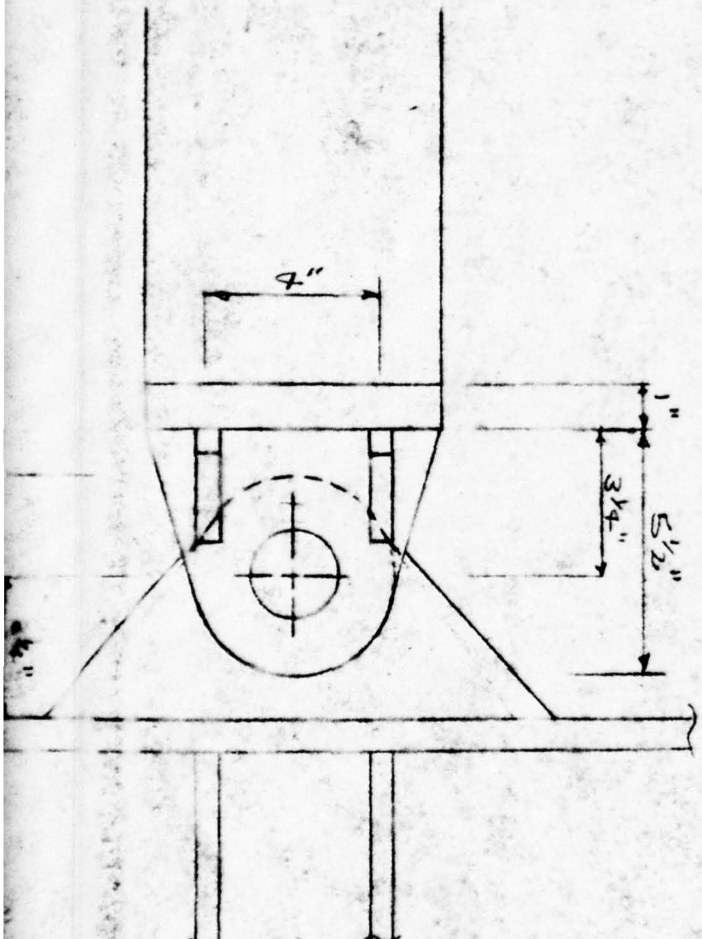
SUBJECT MONO-MOORING SYSTEM

~~DRAWING~~ JOB NO. 56017 COMPUTER ANDREWS CHKD. BY DATE 6-7 1965

.824
1.56
.31
2.694



"A" FRAME CONNECTIONS



MAX. $P \approx 40^k$ $H \approx \frac{3}{16}(40) = \underline{7.5^k}$ $V \approx \underline{40^k}$

CHECK PIN DIA. 2"

SHEAR $= 94.3^k > 40^k$ O.K.

BEARING $= 64(2) = 128^k > 40^k$ O.K.

$M = 20(1.125) = 22.5''^k < 23.7''^k$ O.K.

CHECK BENDING IN 2" PL

$M \approx 7.5(2) = \underline{15.0}''^k$

$S = \frac{bd^2}{6} = \frac{2(2)^2}{6} = \underline{1.33 \text{ IN.}^3}$

$f = \frac{15}{1.33} = \underline{11.2 \text{ ksi}}$ O.K.

CHECK WELD IN 2" PL

$H_{xx} = \underline{7.5^k}$ $H_{yy} = \underline{7.5^k}$

$M_{xx} = 7.5(5) = \underline{37.5}''^k$ $M_{yy} = 7.5(3.25) = \underline{24.4}''^k$

$^k/_{''\,xx} = \frac{7.5}{24} = \underline{.312\,^k/_{''}}$

$^k/_{''\,yy} = \frac{7.5}{24} = \underline{.312\,^k/_{''}}$

$I_{xx} = AD^2 = 24(1)^2 = \underline{24 \text{ IN.}^4}$

$I_{yy} = \frac{bd^3}{12} = \frac{2(12)^3}{12} = \underline{288 \text{ IN.}^4}$

$f_{xx} = \frac{Mc}{I} = \frac{37.5(1)}{24} = \underline{1.56\,^k/_{''}}$

$f_{yy} = \frac{Mc}{I} = \frac{24.4(6)}{288} = \underline{.51\,^k/_{''}}$

TOTAL $^k/_{''} = .312 + .312 + 1.56 + .51 = \underline{2.694\,^k/_{''}}$

TRY 1/2" FILLET WELD

ALLOW $^k/_{''} = .5(.707)(13.5) = \underline{4.77\,^k/_{''} > 2.7}$ O.K.

J. RAY MCDERMOTT & CO., INC.

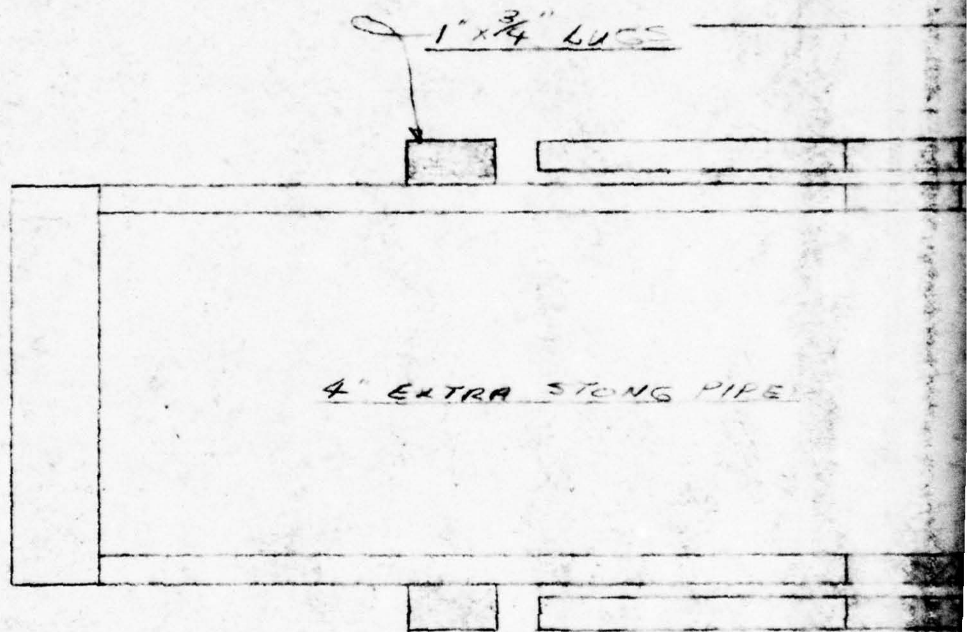
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET No. 6

COMPANY U.S. ARMY/ERDL

SUBJECT MONO-MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-4 1965



MAX. TENSION ≈ 12^k MIN. WALL THICKNESS = .337"

TRY $1\frac{1}{4}$"φ PINS SPACE $1\frac{3}{8}$"φ HOLES 12" O.

ALLOW V = $36.8^k > 12^k$ O.K.

ALLOWABLE BRG. = .337(2)(40) = $27^k > 12^k$ O.K.

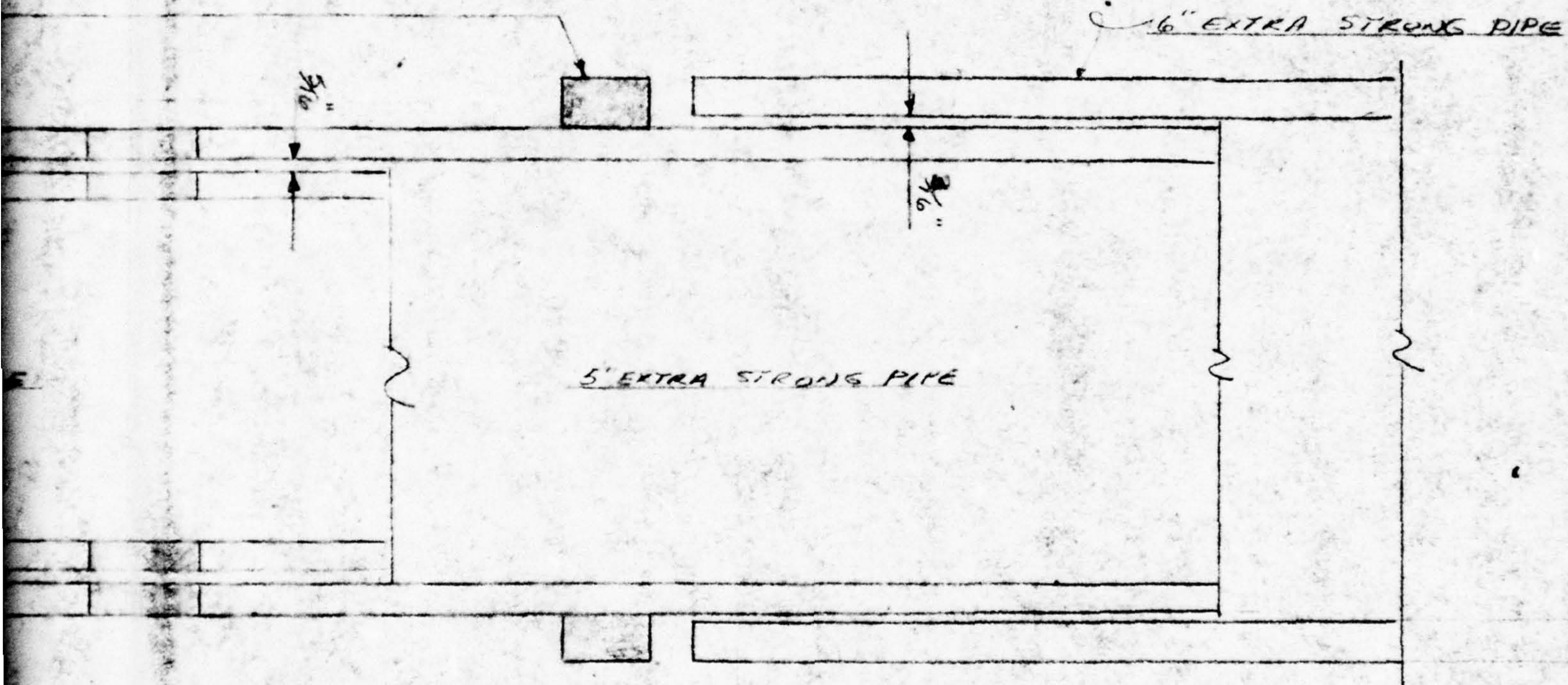
$M \approx 6(.75) = 4.5^{"k} < 5.7$ O.K.

USE $1\frac{1}{4}$"φ PINS W/RETAINING NUTS

6

"H" FRAME TELESCOPING LEGS

.65



"O. IN 5 & 6" PIPE

7

J. RAY McDERMOTT & CO., INC.

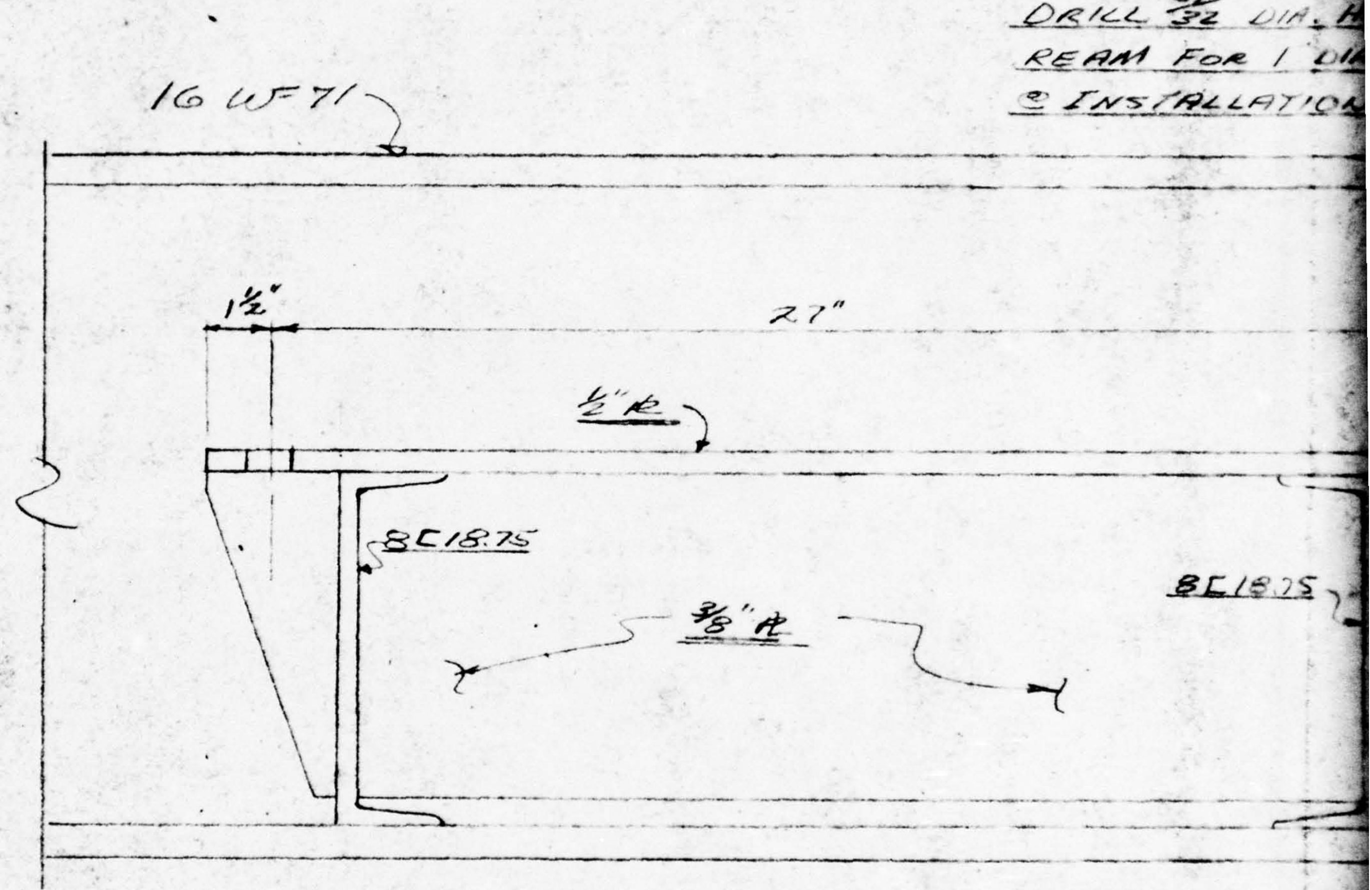
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET No. 2

COMPANY U.S. ARMY / EROL

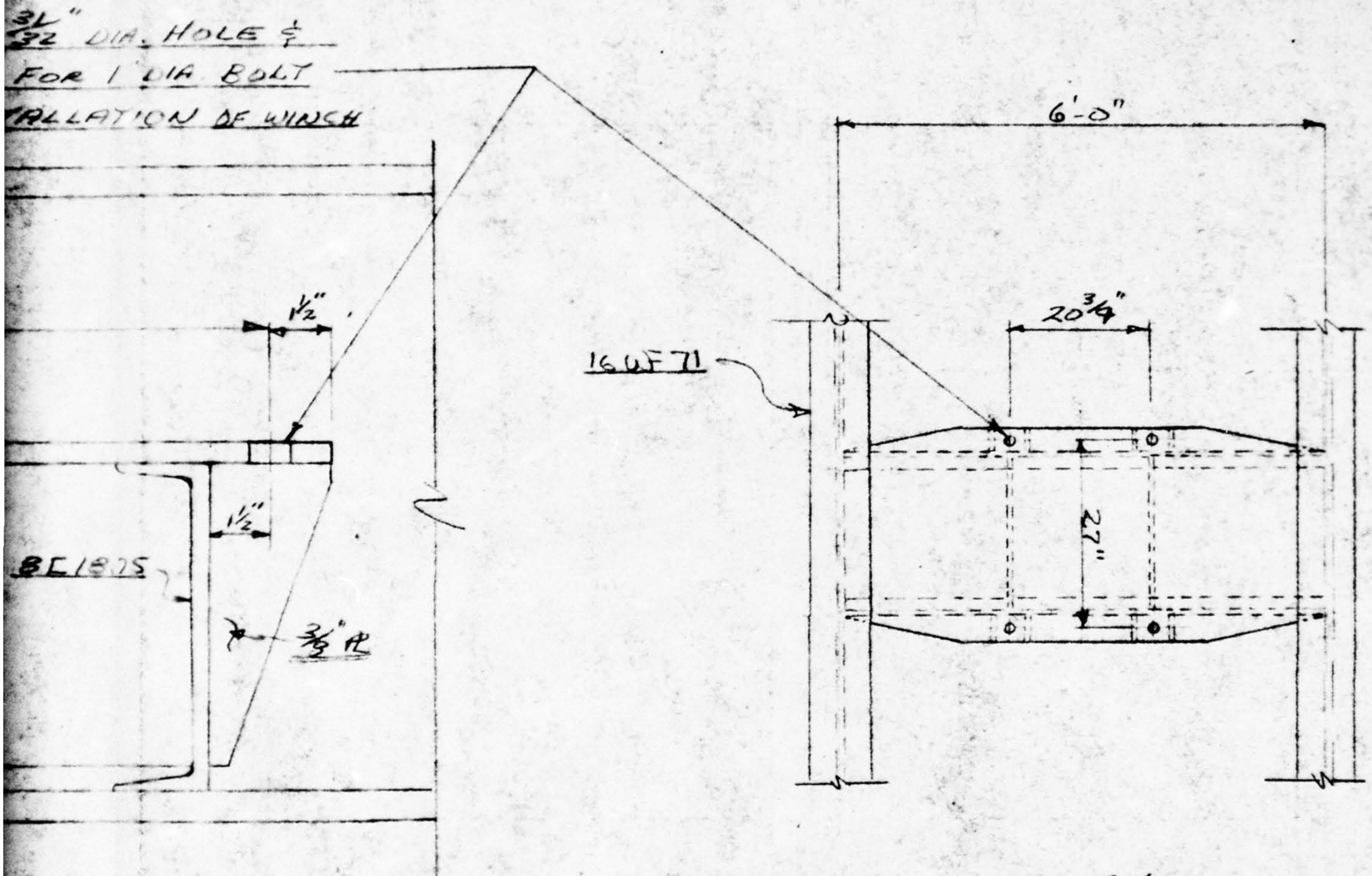
SUBJECT MONO-MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-8 19 65



SECTION
¼" = 1"

HYDRAULIC WINCH FOUNDATION



PLAN
1/2" = 1'-0"

J. RAY McDERMOTT & CO., INC.

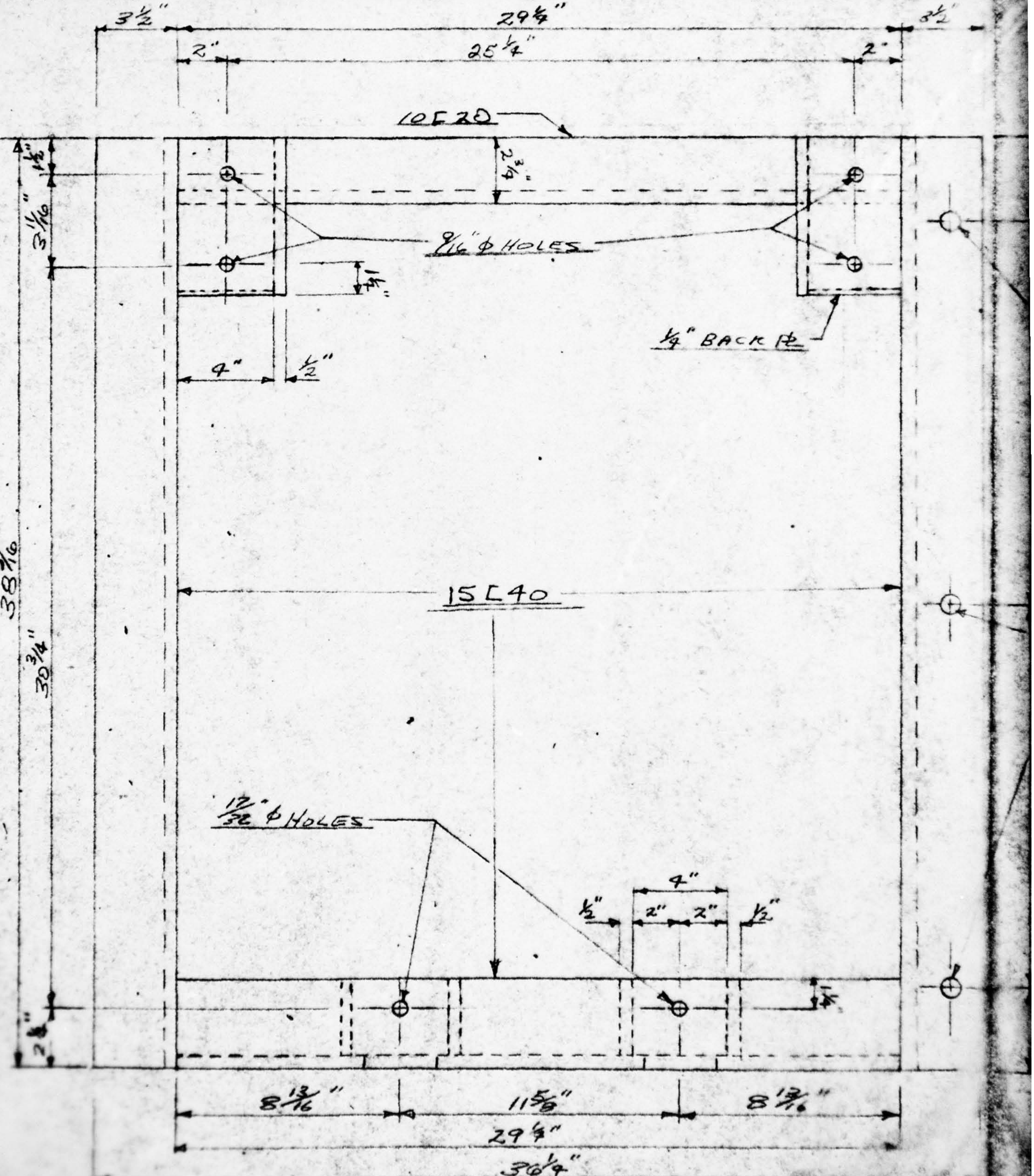
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 1

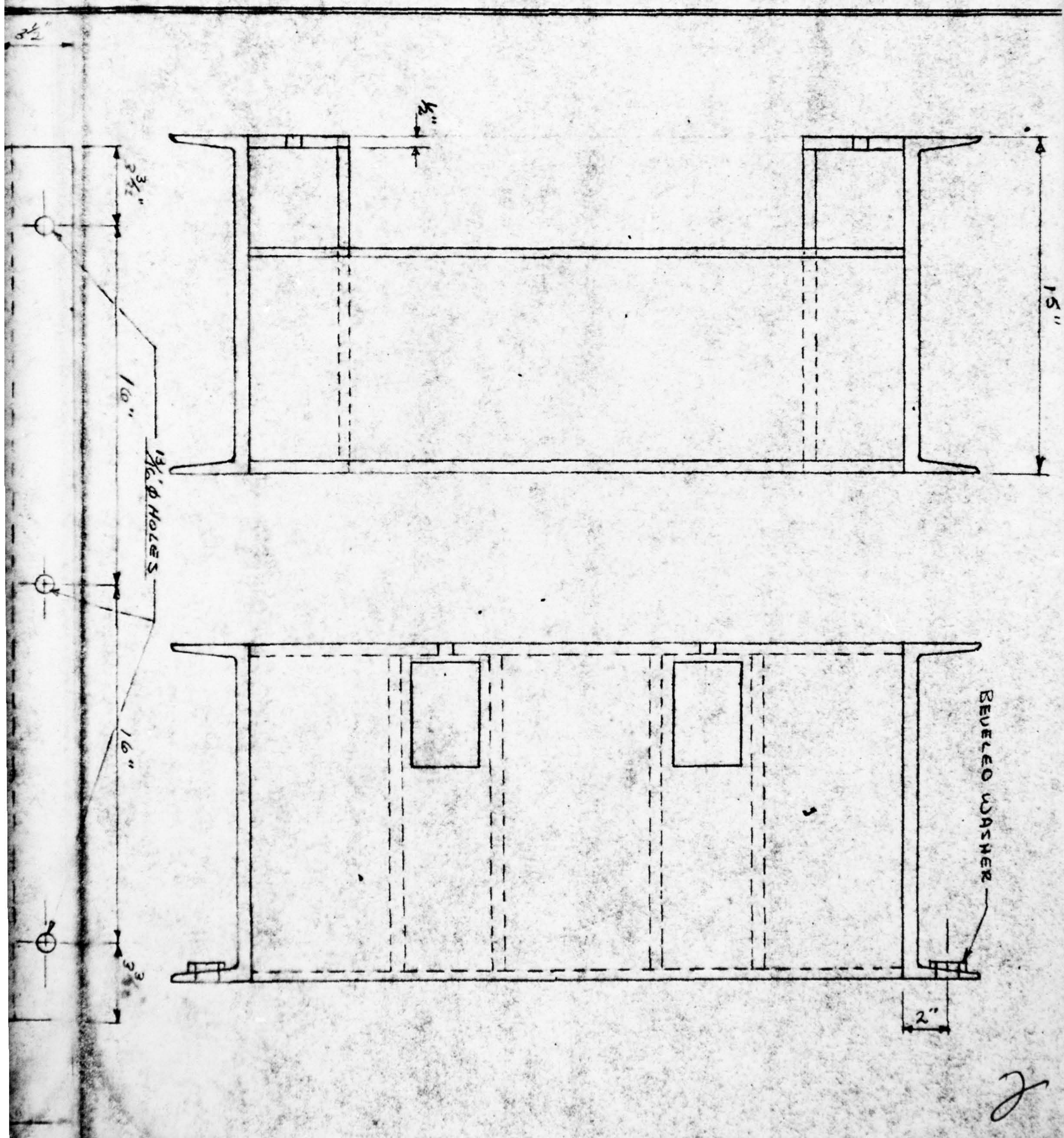
COMPANY U. S. ARMY / ERDL

SUBJECT MONO- MOORING SYSTEM

~~DRAWING~~ JOB NO. 56017 COMPUTER ANDREWS CHKD. BY DATE 6-8 1965



DIESEL ENGINE SUPPORTS



7

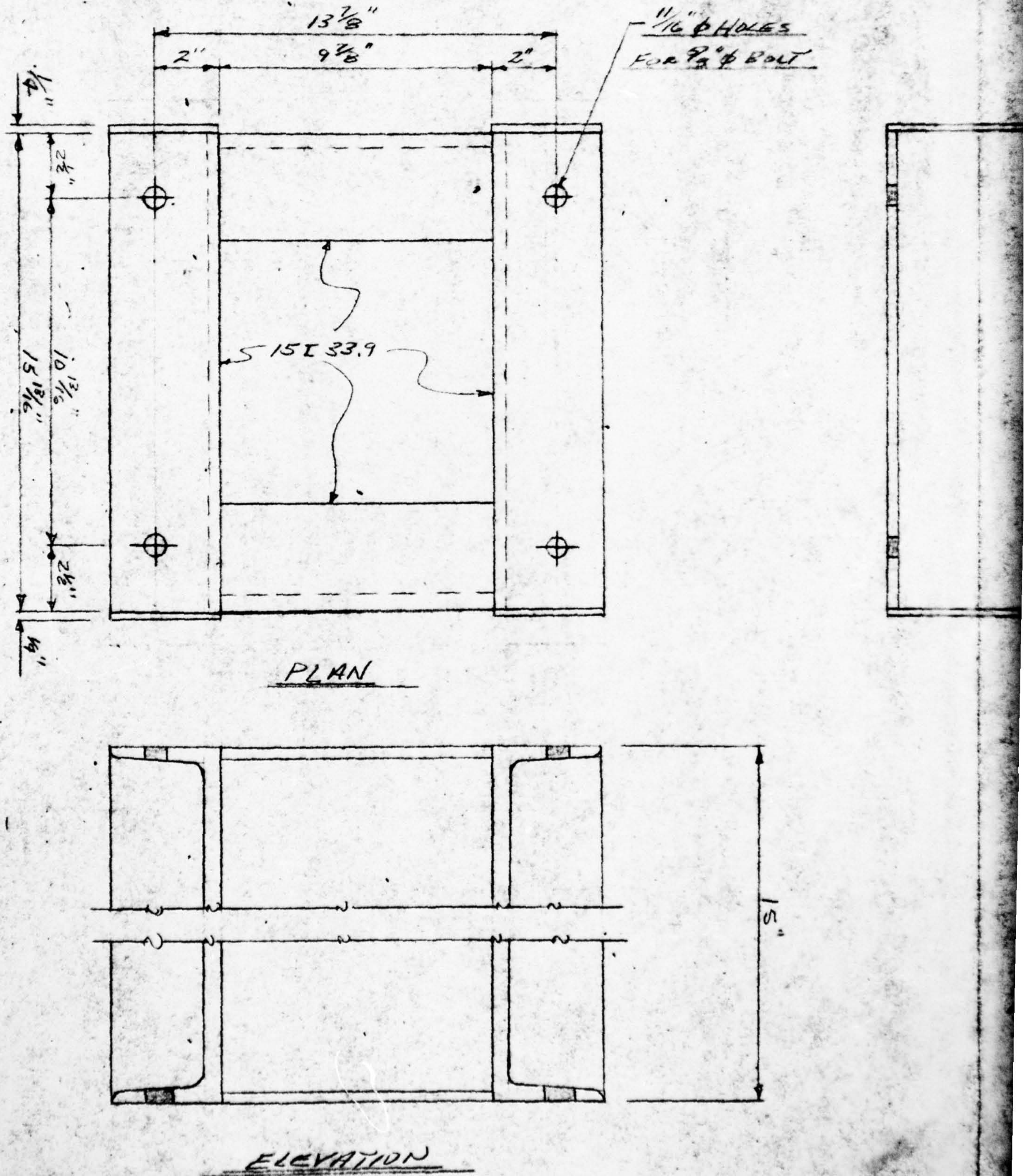
J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET — SHEET NO. 1

COMPANY U. S. ARMY / ERDL

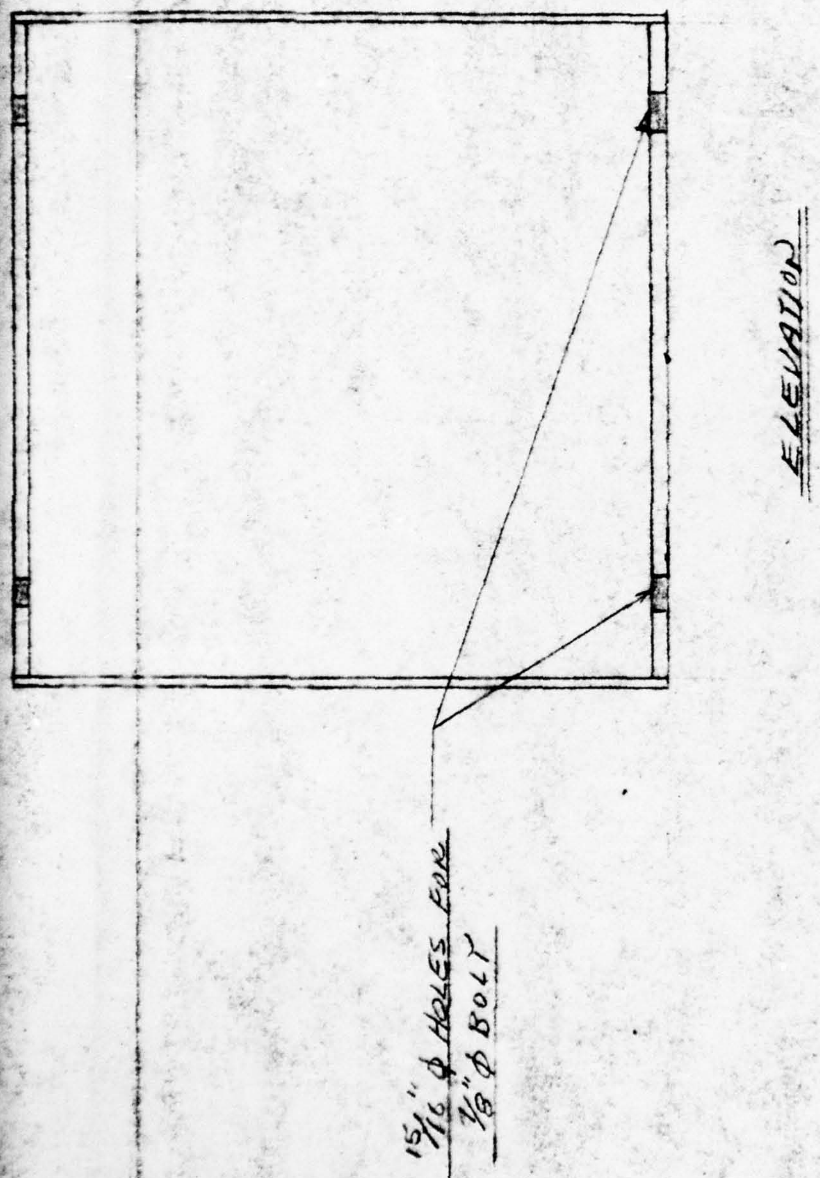
SUBJECT MONO - MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY DATE 7/28 1965



3177

BASE FOR 5T HAND WINCH



J. RAY McDERMOTT & CO., INC.

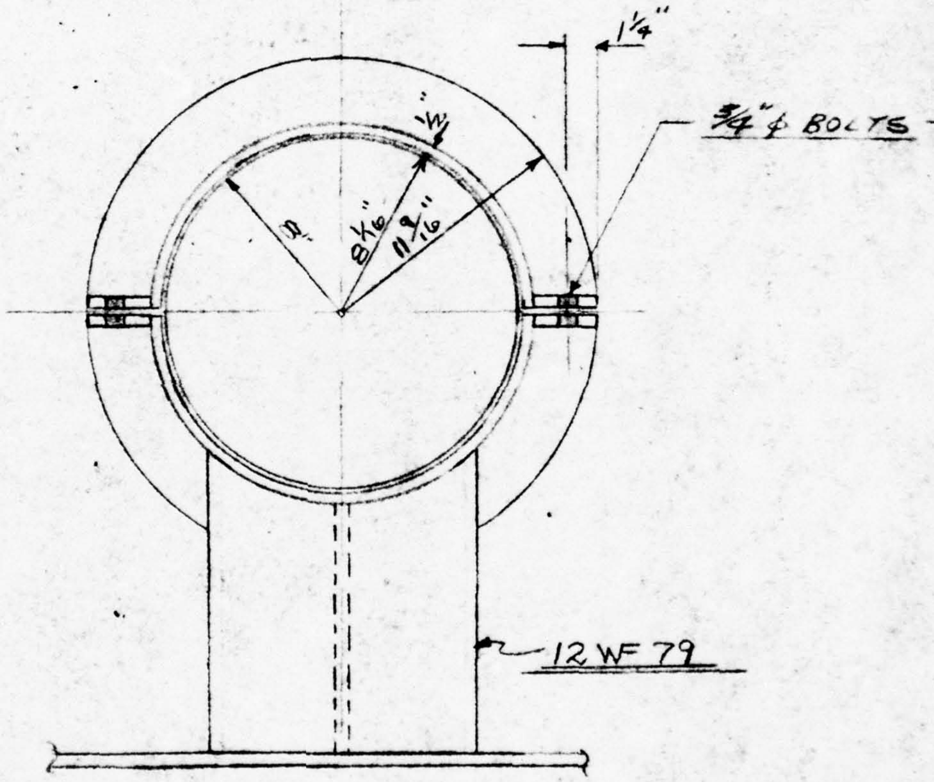
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 1

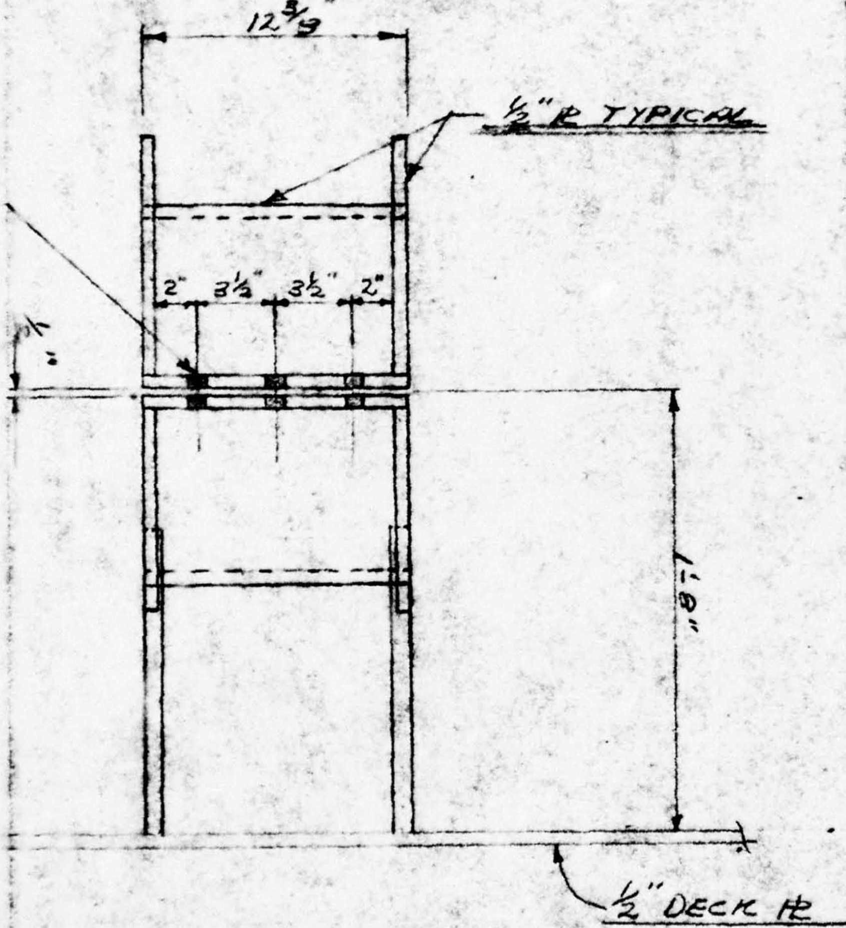
COMPANY U.S. ARMY/ERDL

SUBJECT MONO-MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-15 1965



PIPE SUPPORTS



MAX. $F = \underline{14^K}$

$M = 14(20) = \underline{280^{"K}}$

12 WF 79 O.K. BY INSPECTION

CHECK WELD

$K/_{"} = \frac{14}{20} = .7\ ^{K}/_{"}$

$I = AD^2 = 24(6)^2 = \underline{865}$

$K/_{"} = \frac{MC}{I} = \frac{280(6)}{865} = \underline{1.99\ ^{K}/_{"}}$

USE ¼" FILLET WELD

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 2

COMPANY U.S. ARMY / ERDL

SUBJECT MONO-MOORING SYSTEM

~~DRAWING~~ JOB NO. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-15 1965

$MAX.\ H = \underline{\underline{16^{K}}}$

$M = 16(38) = \underline{\underline{606''^{K}}}$

$f = \frac{M}{S} = \frac{606}{45} = \underline{\underline{13.5\ KSI}}$

<u>CHECK WELD</u>

TOTAL INCHES $\simeq \underline{\underline{36''}}$

$K/'' = \frac{16}{36} = \underline{\underline{.445\ K/''}}$

$I = \frac{bd^3}{12} = \frac{8(14)^3}{12} = 1840$

$\frac{6(12)^3}{12} = 864$

$\underline{\underline{976\ IN.^4}}$

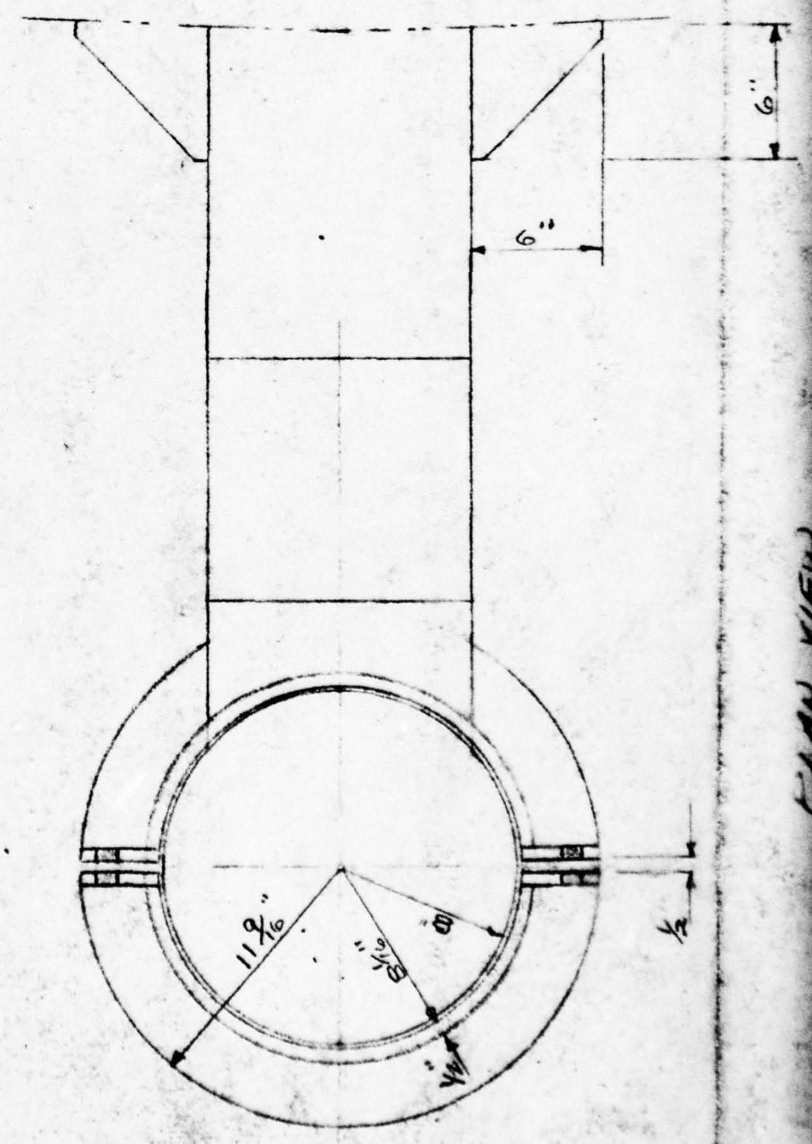
$K/'' = \frac{Mc}{I} = \frac{606(6)}{976} = \underline{\underline{3.72\ K/''}}$

$TOTAL\ K/'' = 3.72 + .445 = \underline{\underline{4.165\ K/''}}$

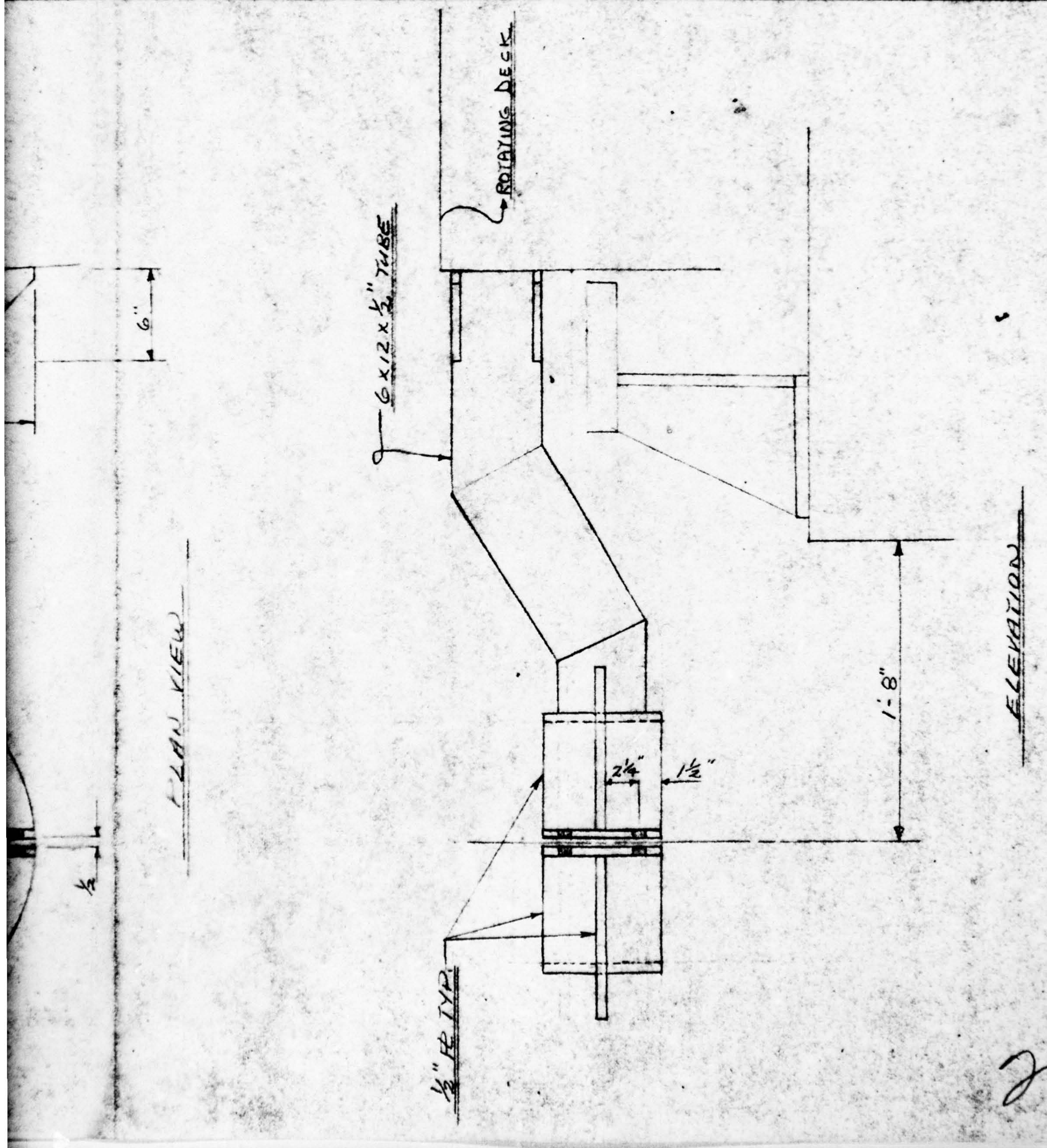
<u>TRY ½" WELD</u>

$ALLOW\ K/'' = .5(.707)(13) = \underline{\underline{4.6\ K/''}}$

<u>½" FILLET WELD O.K.</u>



PIPE SUPPORTS



J. RAY McDERMOTT & CO., INC.

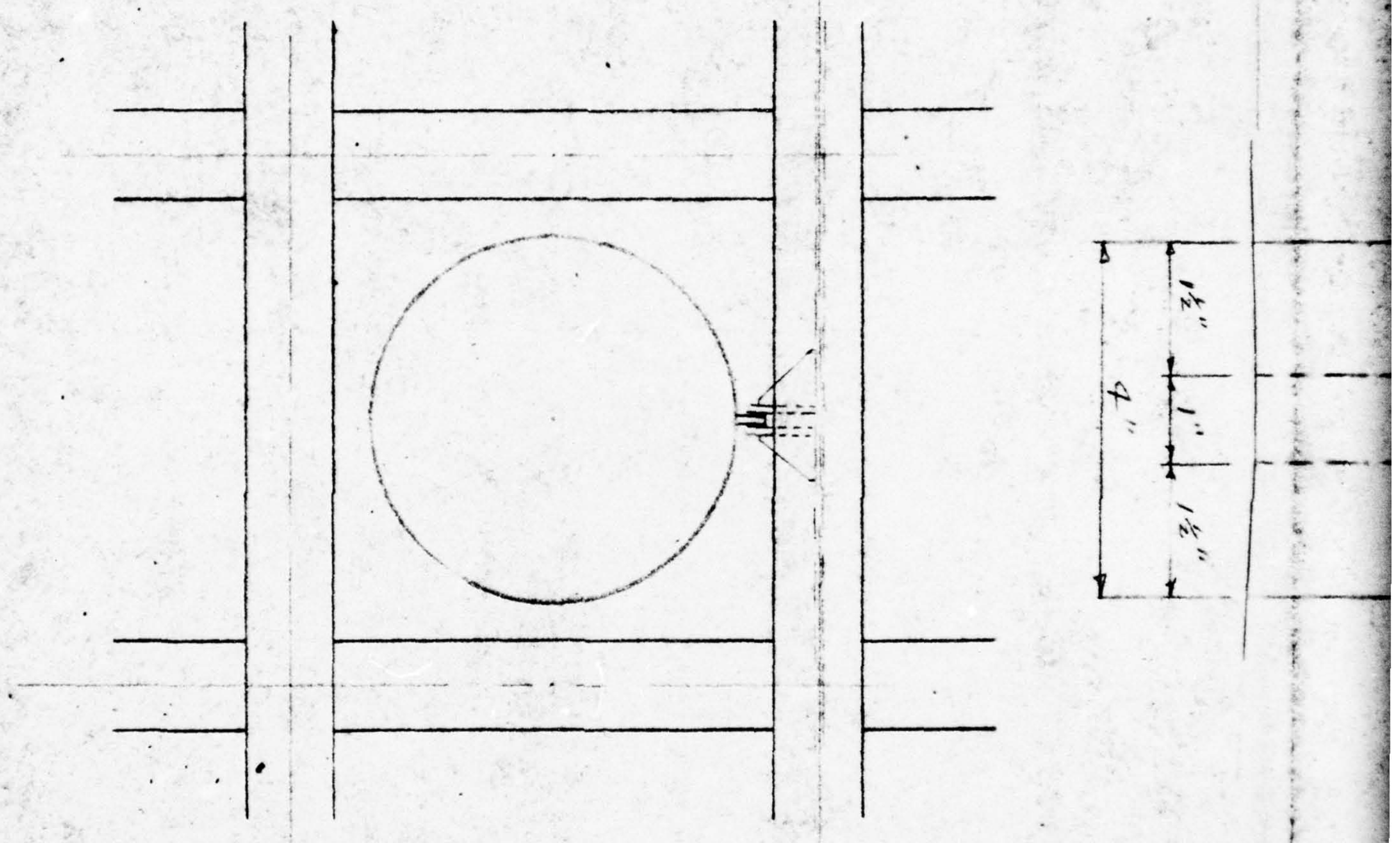
ENGINEERING DEPARTMENT - COMPUTATION SHEET

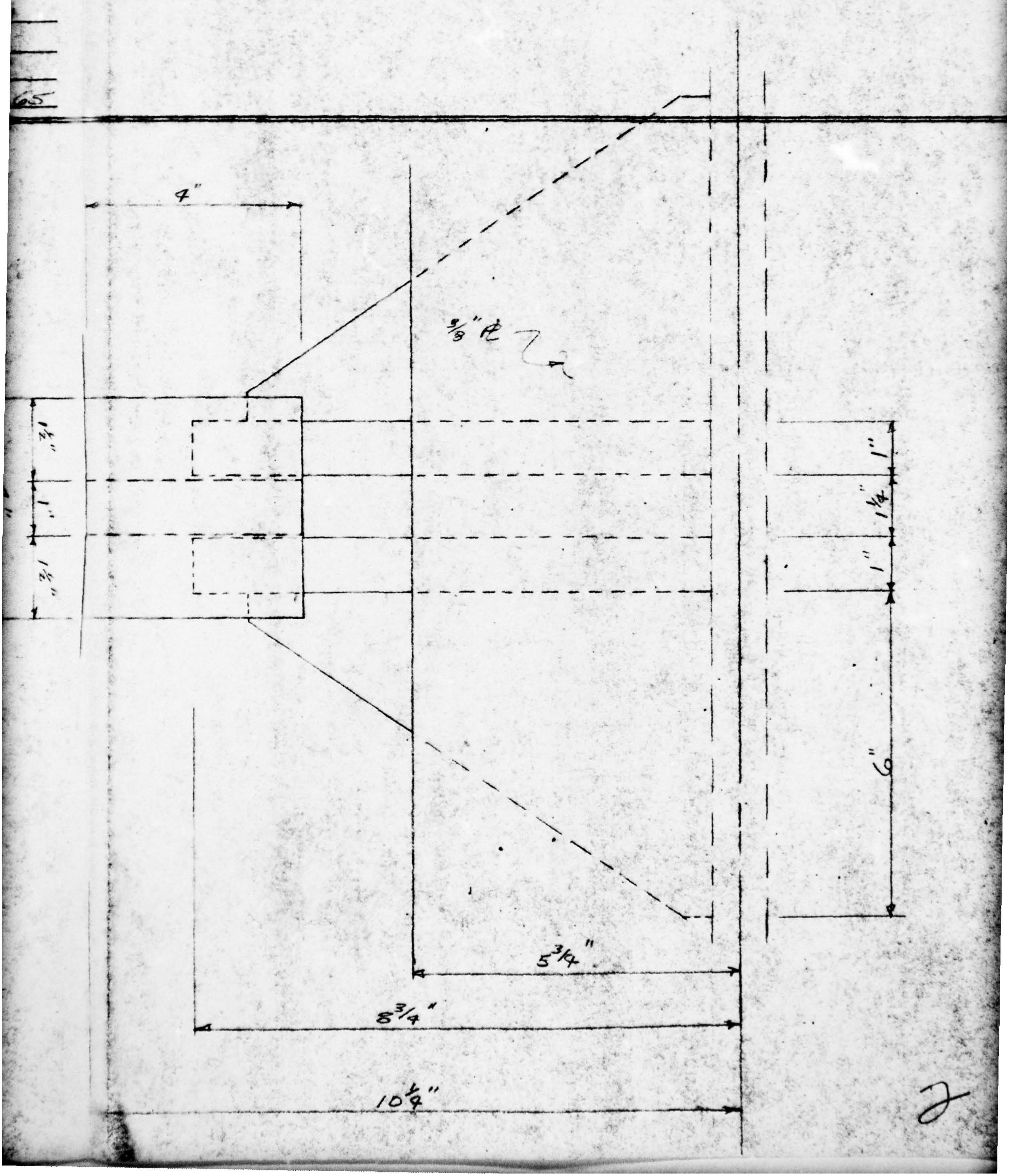
SHEET NO. 1

COMPANY U. S. ARMY / ERDL

SUBJECT MONO-MOORING SYSTEM

JOB No. 56017 COMPUTER ANDREWS CHKD. BY DATE 7/14 1965





2

J. RAY McDERMOTT & CO., INC.

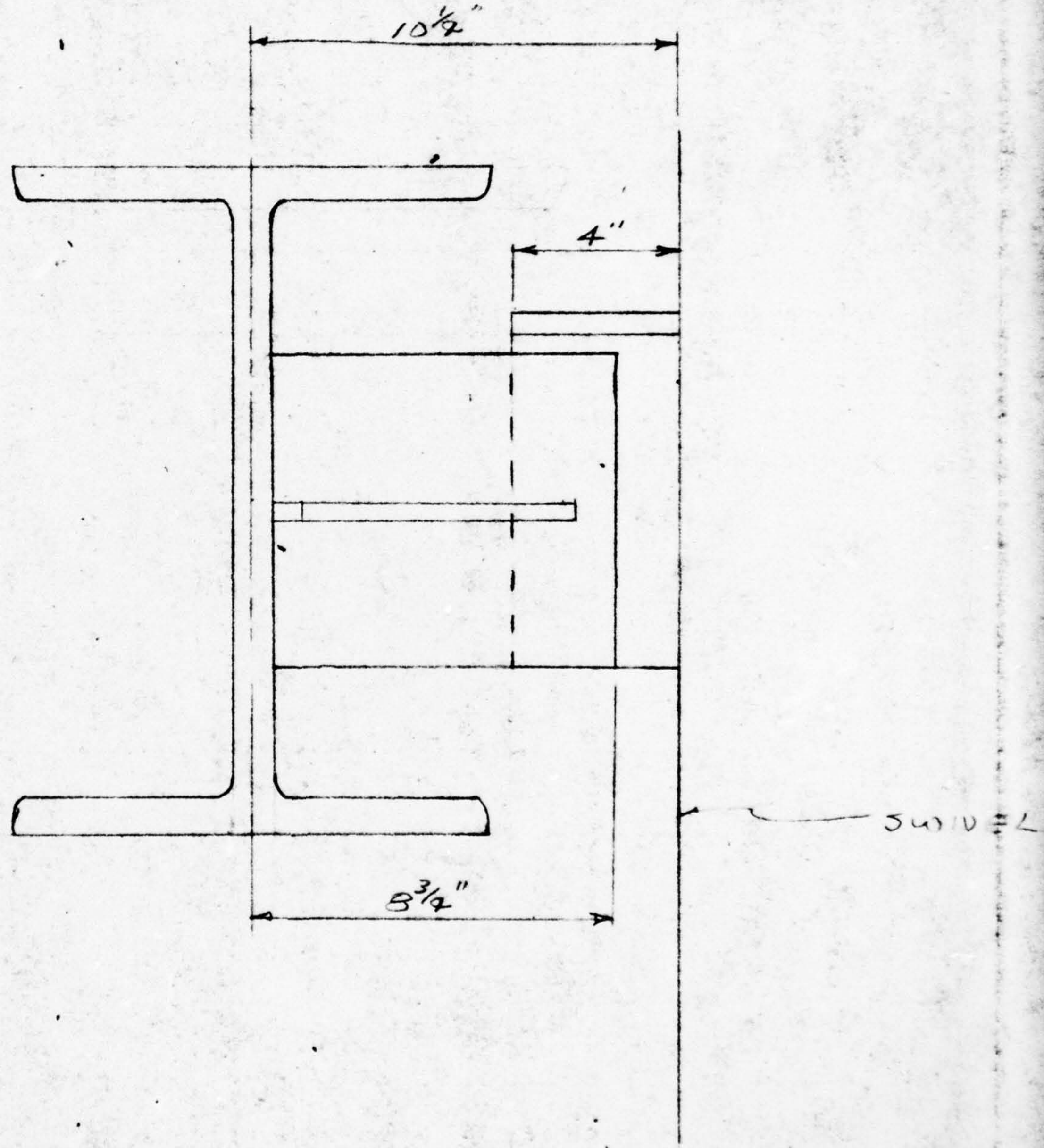
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO.______

COMPANY______

SUBJECT______

DRAWING NO.______ COMPUTER______ CHKD. BY______ DATE______ 19___



8177

J. RAY McDERMOTT & CO., INC.

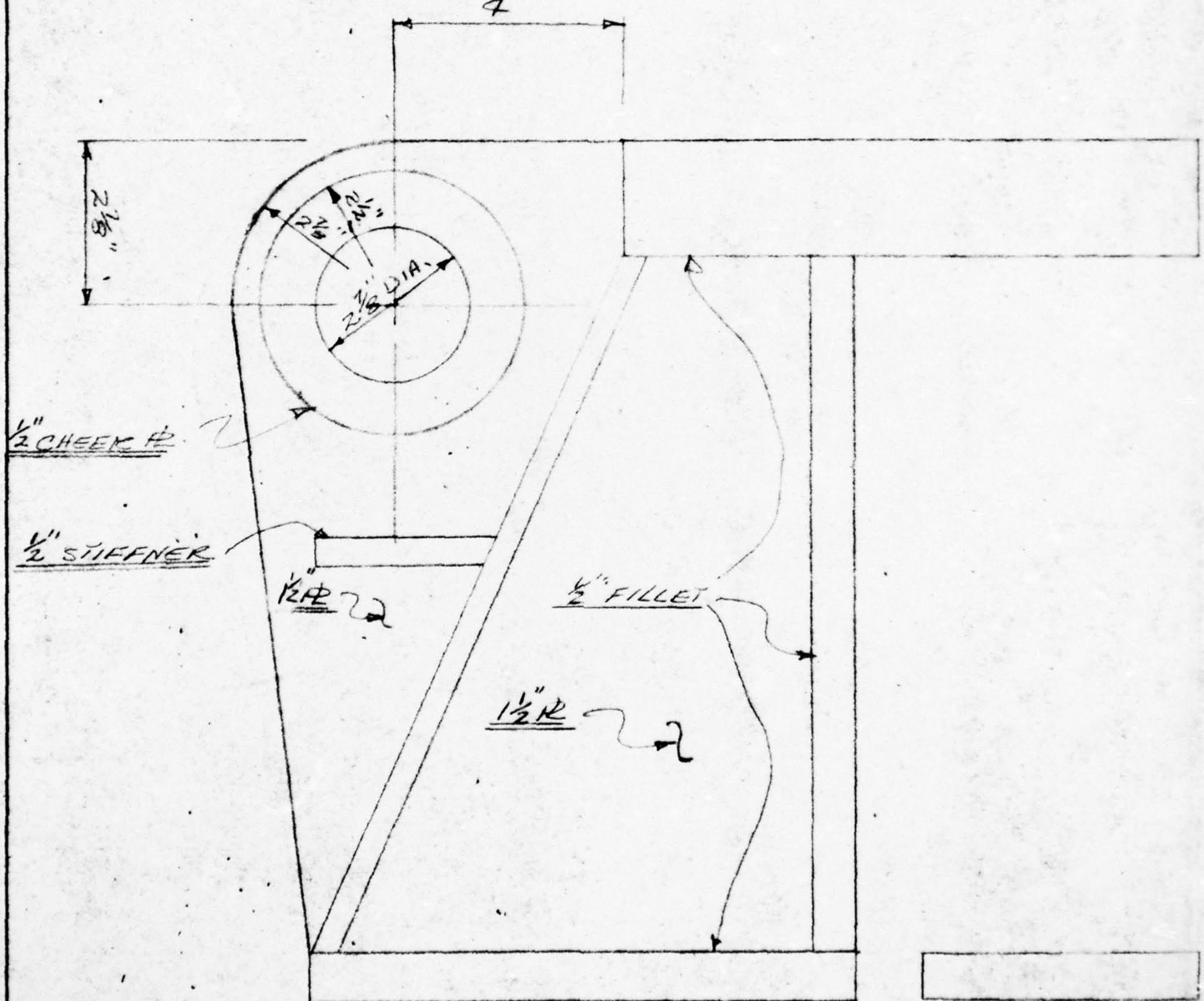
ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 1

COMPANY U. S. ARMY / ERDL

SUBJECT MONO-MOORING SYSTEM

~~DRAWING~~ JOB NO. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 7 - 8 1965



LIFTING EYES

MAX. WT. $\approx$ 280^k

USE FOUR PICK-UP POINTS

VERTICAL REACTION / PT. $= \frac{280}{4} = 70^k$

ASSUME SLING ℄ = 30° FROM VERTICAL

$P = \frac{70}{.866} = 81^k \times 2$ FOR IMPACT $= 162^k$

TRY $2\frac{3}{4}''\phi$ PIN

SHEAR ALLOW $P = 178^k > 162^k$ O.K.

BEARING ALLOW $P = 88(2.5) = 220^k > 162^k$ O.K.

CHECK LENGTH OF $\frac{1}{2}''$ FILLET WELD TO DEVELOPE 162^k

$P/_{"} = .707(.5)(13.6) = 4.8^k/_{"}$

$L = \frac{162}{4.8} = 33.7''$ O.K.

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET

SHEET NO. 1

COMPANY U. S. ARMY / EROL

SUBJECT MONO-MOORING SYSTEM

JOB DRAWING NO. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 6-2 1965

CHECK LAUNCHING LOAD ON BUOY

WEIGHT = 100T VELOCITY = 20 FPS Δ = 8 FEET

$$KV = \frac{1}{2}MV^2 = \frac{1}{2}\left(\frac{200{,}000}{32.2}\right)(20)^2 = 1{,}240{,}000^{\prime\#}$$

$$KV = \frac{P\Delta}{2}$$

$$P = \frac{2(KV)}{\Delta} = \frac{2(1{,}240{,}000)}{8} = \underline{310{,}000^{\#}}$$

ASSUME CONTRIBUTORY AREA 14 FT. X 20 FT.

$$\text{PRESSURE} = \frac{P}{A} = \frac{310{,}000}{14(20)(144)} = \underline{7.70\ psi} \quad \underline{O.K.}$$

BUOY HULL WILL WITHSTAND LAUNCHING PRESSURE OF 7.70 psi

CONSIDER SWIVEL SUPPORT

ASSUME WT. OF SWIVEL = $\underline{20^K}$

$$P = \frac{20}{200}(310) = \underline{31^K}$$

SWIVEL SUPPORT ADEQUATE BY INSPECTION

SEE PG. 2 CALCULATIONS ENTITLED: SWIVEL TO BUOY CONN.

9177

AD-A034 242 MCDERMOTT (J RAY) CO INC NEW ORLEANS LA F/G 13/10

ENGINEERING DESIGN CALCULATIONS MONO-MOORING SYSTEM. VOLUME 1. --ETC(U)

1966 DA-44-009-AMC-841(T)

UNCLASSIFIED NL

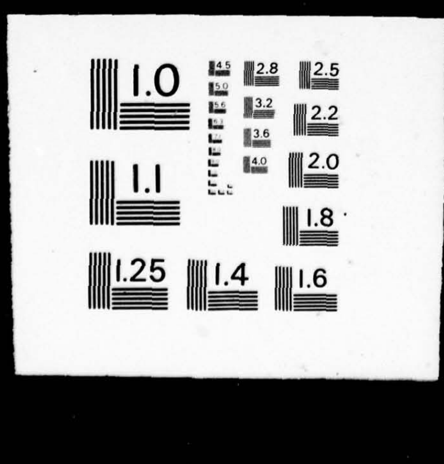
3 OF 4

ADA034242

SIFIED

3 OF 4

ADA034242



COMP
ENGIN
McD 5011
COMPANY
SUBJECT
DRAWING

COMPUTATION SHEET
ENGINEERING DEPARTMENT
McD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	

BUOY HEEL ANGLE COMPUTER PROGRAM

AND

SAMPLE RESULTS

DESIGN OF BUOY HULL

~~ROTATING DECK & A-FRAME~~

ENGINEERING DEPARTMENT
COMPUTATION SHEET

J. RAY McDERMOTT & CO., INC.

COMPANY: U. S. ARMY ENGINEER RESARCH DEVELOPEMENT LABORATORIES

SHEET NO. 1

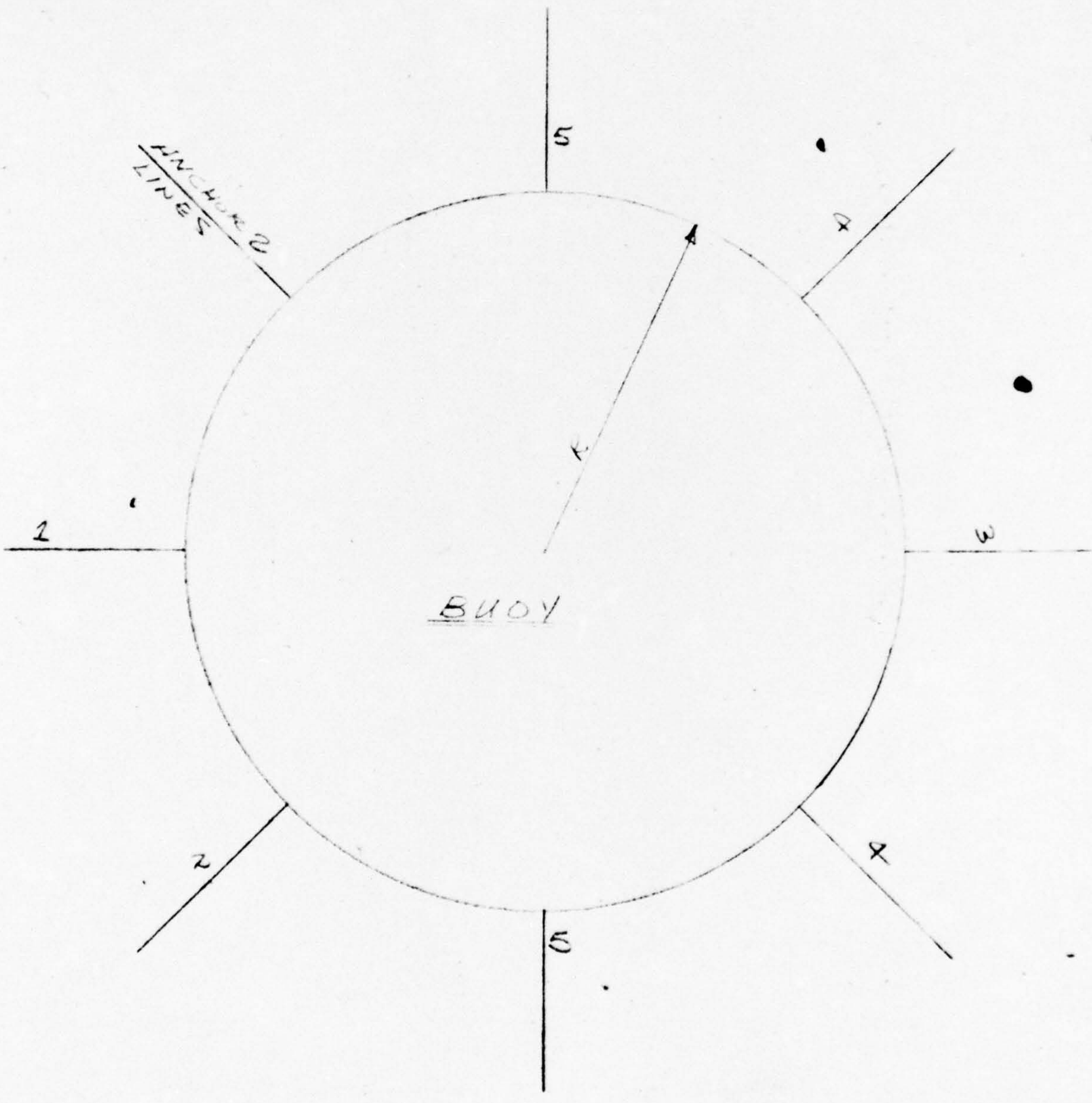
SUBJECT: MONO-MOORING SYSTEM

NUMBER: JOB 56017

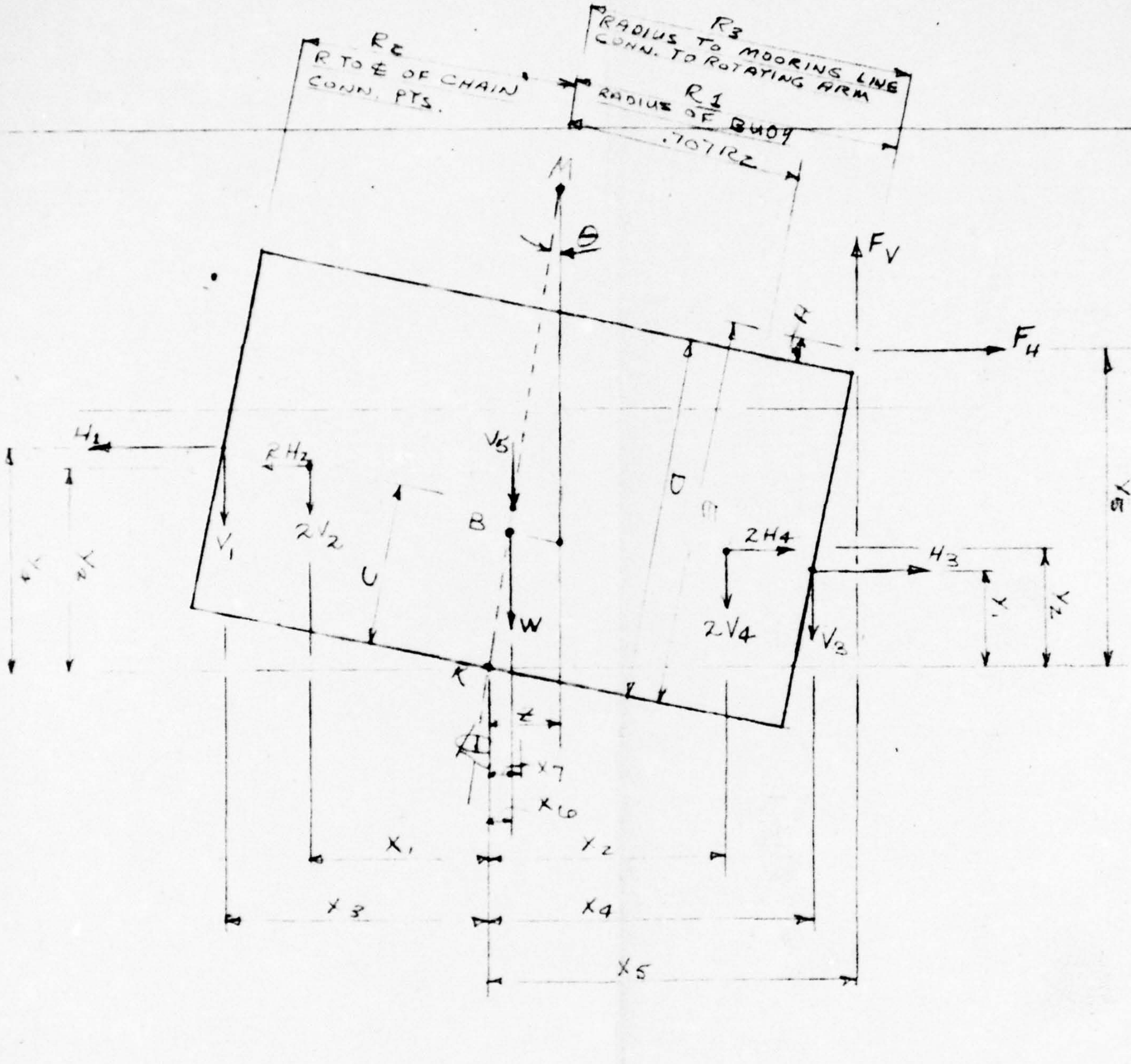
COMPUTED: ANDREWS

CHECKED BY:

DATE: 12/4/67



1



FREE BODY DIAGRAM OF BUOY

2

2a

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5086

J. RAY McDERMOTT & CO., INC.

COMPANY: ERDL

SUBJECT: MONO - MOORING SYSTEM

NUMBER: JOB 56017 | COMPUTED: ANDREWS | CHECKED BY: | DATE: 12/4/64 | SHEET NO:

Σ HORIZONTALS = 0

$$\Sigma H = F_H + H_3 + 2H_4 - H_1 - 2H_2 = 0$$

Σ VERTICALS = 0

$$\Sigma V = F_V - V_1 - 2V_2 - 2V_4 - V_3 - V_5 - W + B$$

$$\boxed{B = V_1 + 2V_2 + 2V_4 + V_3 + V_5 + W - F_V}$$

Σ MOMENT @ K = 0

$$M = F_H(Y_5) + H_3(Y_1) + 2H_4(Y_2) + V_3(X_4) + 2V_4(X_2) + 2V_5(X) + W(X) - F_V($$

DETERMINE X, Y & Z DISTANCES

$$X_1 = (.707R_2 - C\,TAN\,\theta)\cos\theta$$

$$\boxed{X_1 = (.707R_2\cos\theta - C\sin\theta)}$$

$$X_2 = (.707R_2 + C\,TAN\,\theta)\cos\theta$$

$$\boxed{X_2 = (.707R_2\cos\theta + C\sin\theta)}$$

$$X_3 = (R_2 - C\,TAN\,\theta)\cos\theta$$

$$\boxed{X_3 = (R_2\cos\theta - C\sin\theta)}$$

$$X_4 = (R_2 + C\,TAN\,\theta)\cos\theta$$

$$\boxed{X_4 = (R_2\cos\theta + C\sin\theta)}$$

$$X_5 = (R_3 + E\,TAN\,\theta)\cos\theta$$

$$\boxed{X_5 = (R_3\cos\theta + E\sin\theta)}$$

$$\boxed{X_6 = \overline{KB}\sin\theta}$$

$$\boxed{B \equiv (\gamma\,.7854\,R_1^4 + E\,\bar{I}\,E)\sin\theta}$$

$$Y_1 = (C - R_2\,TAN\,\theta)\cos\theta$$

$$\boxed{Y_1 = (C\cos\theta - R_2\sin\theta)}$$

$$Y_2 = (C - .707R_2\,TAN\,\theta)\cos\theta$$

$$\boxed{Y_2 = (C\cos\theta - .707R_2\sin\theta)}$$

$$Y_3 = (C + .707R_2\,TAN\,\theta)\cos\theta$$

$$\boxed{Y_3 = (C\cos\theta + .707R_2\sin\theta)}$$

1

$_5(\ldots)+W(\ldots) - F_Y(X_5) - H_1(Y_4) - 2H_2(Y_3) - V_1(X_3) - 2V_2(X_1) - BZ = 0$

$Y_4 = (C + R_2 TAN\theta) COS\theta$

$\boxed{Y_4 = (C\,COS\theta + R_2 SIN\theta)}$

$\ldots E\,T\theta)\,SIN\theta$

$Y_5 = (E - R\,TAN\theta) COS\theta$

$\boxed{Y_5 = (E\,COS\theta - R_3 SIN\theta)}$

$\ldots COS\theta$

$\ldots\theta)$

$\boxed{X_7 = C\,SIN\theta}$

$\ldots\theta)\,COS\theta$

$\ldots R_2 SIN\theta$

$\ldots\theta)\,COS\theta$

$\ldots R_2 SIN\theta)$

2

ENGINEERING DEPARTMENT
COMPUTATION SHEET

J. RAY McDERMOTT & CO., INC.

COMPANY ERDL

SUBJECT MONO - MOORING SYSTEM

JOB 56017 ANDREWS 12/4/64

$$M = F_H(E\cos\theta - R_3\sin\theta) + H_3(C\cos\theta - R_2\sin\theta) + 2H_4(C\cos\theta - .707$$

$$+ W(\overline{KB}\sin\theta) - F_V(R_3\cos\theta + E\sin\theta) - H_1(C\cos\theta + R_2\sin\theta) - 2H_2$$

$$- 2V_2(.707R_2\cos\theta - C\sin\theta) - (\gamma .7854 R_1^4 + B\overline{KB})\sin\theta = 0$$

$$M = F_H E\cos\theta - F_H R_3\sin\theta + H_3 C\cos\theta - H_3 R_2\sin\theta + 2H_4 C\cos\theta - 1.414$$

$$+ 2V_5 C\sin\theta + W\overline{KB}\sin\theta - F_V R_3\cos\theta - F_V E\sin\theta - H_1 C\cos\theta - H_1 R_2\sin\theta - 2H_2$$

$$- 1.414 V_2 R_2\cos\theta + 2V_2 C\sin\theta - \gamma .7854 R_1^4\sin\theta - B\overline{KB}\sin\theta = 0$$

$$\tan\theta = \frac{(F_H E + H_3 C + 2H_4 C + V_3 R_2 + 1.414 V_4 R_2 - F_V R_3 - H_1 C - 2H_2}{-(-F_H R_3 - H_3 R_2 - 1.414 H_4 R_2 + V_3 C + 2V_4 C + 2V_5 C + W\overline{KB} - F_V E - H_1 R}$$

$$\tan\theta = \frac{(F_H E + H_3 C + 2H_4 C + V_3 R_2 + 1.414 V_4 R_2 - F_V R_3 - H_1 C - 2H_2 C - 1.414 V_2 R_2}{(F_H R_3 + H_3 R_2 + 1.414 H_4 R_2 - V_3 C - 2V_4 C - 2V_6 C - W\overline{KB} + F_V E + H_1 R_2 +}$$

1

$C\cos\theta - .707 R_2 \sin\theta) + V_3 (R_2\cos\theta + C\sin\theta) + 2V_4 (.707 R_2 \cos\theta + C\sin\theta) + 2V_5 C\sin\theta$

$R_2 \sin\theta) - 2H_2 (C\cos\theta + .707 R_2 \sin\theta) - V_1 (R_2 \cos\theta - C\sin\theta)$

$)\sin\theta = 0$

$C\cos\theta - 1.414 H_2 R_2 \sin\theta + V_3 R_2 \cos\theta + V_3 C\sin\theta + 1.414 V_4 R_2 \cos\theta + 2V_4 C\sin\theta$

$R_2 \sin\theta - 2H_2 C\cos\theta - 1.414 H_2 R_2 \sin\theta - V_1 R_2 \cos\theta + V_1 C\sin\theta$

$\overline{KB} \sin\theta = 0$

$- H_1 C - 2H_2 C - V_1 R_2 - 1.414 V_2 R_2)$

$\overline{KB} - F_V E - H_1 R_2 - 1.414 H_2 R_2 + V_1 C + 2V_2 C - \gamma .7854 R_1^4 - B\overline{KB})$

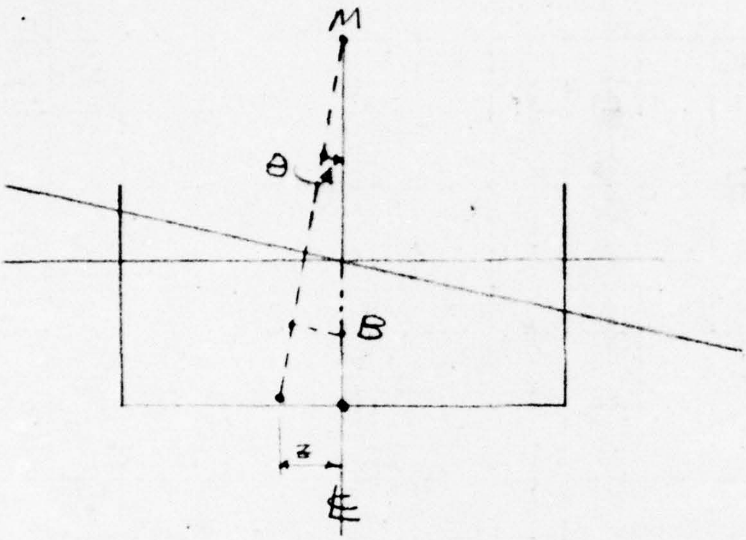
$- 2H_2 C - V_1 R_2 - 1.414 V_2 R_2)$

$- F_V E + H_1 R_2 + 1.414 H_2 R_2 - V_1 C - 2V_2 C + \gamma .7854 R_1^4 + B\overline{KB})$

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: ERDL
SHEET NO.: 4
SUBJECT: MONO-MOORING SYSTEM
~~DRAWING~~ NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 12/8/64



$B = W + \Sigma V$

$B\bar{z} = \overline{KM} \sin\theta \times B$

$\overline{KM} = \overline{KB} + \overline{BM}$

$\overline{BM} = \dfrac{I}{\nabla}$ I = WATER PLANE MOMENT OF INERTIA

$I = .7854 R^4$

∇ = DISPLACED VOLUME IN CU. FT.

$B = \gamma \nabla$ $\nabla = \dfrac{B}{\gamma}$ γ = WT. OF LIQUID IN $^{KIPS}/_{FT^3}$

$\overline{BM} = \dfrac{.7854 R^4}{\frac{B}{\gamma}}$

$\overline{KM} = \overline{BM} + \overline{KB} = \left(\dfrac{.7854 R^4}{\frac{B}{\gamma}}\right) + \overline{KB}$ $\overline{KB} = \dfrac{d}{2}$ } FOR CYLINDER WITH FLAT BOTTOM

$B\bar{z} = \left(\dfrac{.7854 R^4}{\frac{B}{\gamma}} + \overline{KB}\right) \sin\theta \times B$

$$B\bar{Z}\frac{B}{\gamma} = \left(.7854R^4 + \bar{K}B\frac{B}{\gamma}\right)\sin\theta \times B$$

$$B\bar{Z}B = \left(.7854R^4\gamma + \bar{K}B\,B\right)\sin\theta \times B$$

$$\boxed{B\bar{Z} = \left(.7854R^4\gamma + \bar{K}B\,B\right)\sin\theta}$$

```
10 READ 1,R1,R2,R3,W,C,D,E,BK
   IF(R1)20,30,20
20 READ 1,FH,H1,H2,H3,H4
   READ 1,FV,V1,V2,V3,V4,V5,WL
 1 FORMAT (F10.4,F10.4,F10.4,F10.4,F10.4,F10.4,F10.4,F10.4)
   B=V1+2.*V2+2.*V4+V3+2.*V5+W-FV
   TOP1 = (FH*E+H3*C+2.*H4*C+V3*R2+1.414*V4*R2)
   TOP2 = (-FV*R3-H1*C-2.*H2*C-V1*R2-1.414*V2*R2)
   BOT1 = (FH*R3+H3*R2+1.414*H4*R2-V3*C-2.*V4*C-2.*V5*C-W*BK+FV*E)
   BOT2 = (H1*R2+1.414*H2*R2-V1*C-2.*V2*C+WL*.7854*R1**4+B*BK)
100 TANA =(TOP1+TOP2)/(BOT1+BOT2)
200 DEG = 180.*ATANF(TANA)/3.14
   PRINT 4,B,DEG
 4 FORMAT (10X,3HB =,F10.4,10X,5HDEG =,F10.6)
   GO TO 10
30 PAUSE
   END
```

J. RAY McDERMOTT & CO., INC.

Form McD-568 ENGINEERING DEPARTMENT - COMPUTATION SHEET SHEET No. 1

COMPANY USA ERDL

SUBJECT MONO MOORING SYSTEM BUOY HEEL ANGLE

JOB DRAWING No 56017 COMPUTER ANDREWS CHKD. BY DATE 12/29 1969

DEFINITION OF VARIABLES

√R1 = RADIUS OF BUOY

√R2 = RADIUS TO ℄ OF PENDANT CONN. PT.

√R3 = RADIUS TO ℄ OF MOORING LINE CONN. TO ROTATING PLATFORM.

√W = WEIGHT OF BUOY

√C = DISTANCE FROM PT. K TO PENDANT CONN. PT.

D = DEPTH OF BUOY

√E = DISTANCE FROM PT. K TO MOORING LINE CONN. PT.

√BK = DISTANCE FROM PT. K TO POINT OF BUOYANCY

√FH = HORIZONTAL COMPONENT FROM MOORING LINE

√H1 = HORIZONTAL @ BUOY FROM CORRESPONDING PENDANT

√H2 = " " " " " "

√H3 = " " " " " "

√H4 = " " " " " "

√FV = VERTICAL COMPONENT FROM MOORING LINE

√V1 = VERTICAL @ BUOY FROM CORRESPONDING PENDANT

√V2 = " " " " "

√V3 = " " " " "

√V4 = " " " " "

√V5 = " " " " "

WL = WEIGHT OF LIQUID FLOATING BUOY

LOAD DATA

B = 314.1000	DEG = 15.98099	Cp=0	C = 4	Fv = 50
B = 314.1000	DEG = 14.656417	1	5	= 50
B = 314.1000	DEG = 11.823692	3	7	= 50
B = 314.1000	DEG = 8.730104	5	9	= 50
B = 314.1000	DEG = 5.358545	7	11	= 50
B = 364.1000	DEG = 20.022306	0	4	= 0
B = 264.1000	DEG = 12.164299	0	4	= 100
B = 214.1000	DEG = 8.584930	0	4	= 150
B = 164.1000	DEG = 5.246722	0	4	= 200

R1 = 12.5

R2 = 13.5

R3 = 12.5

W = 200

D = 14.5

E = 19.5

BK = 9.5

FH = 300

H1 = 208.9

H2 = 52.5

H3 = 4

H4 = 4.95

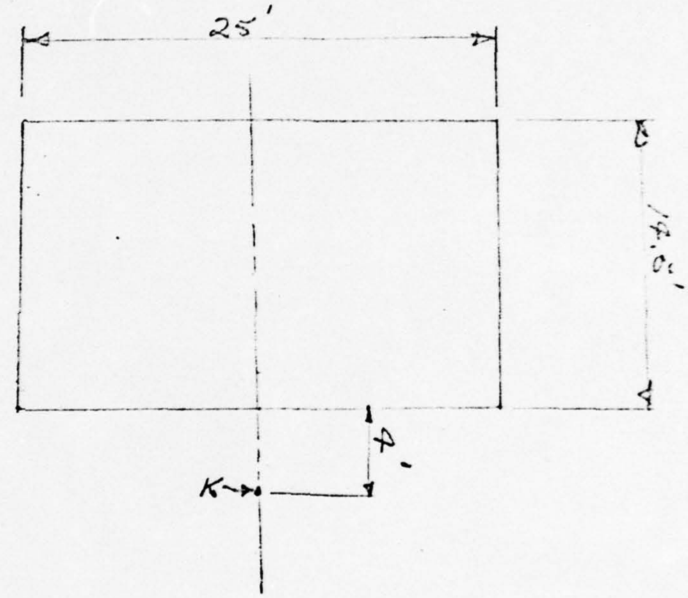
V1 = 58.7

V2 = 34.6

V3 = 11.4

V4 = 12.4

WL = .064



ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

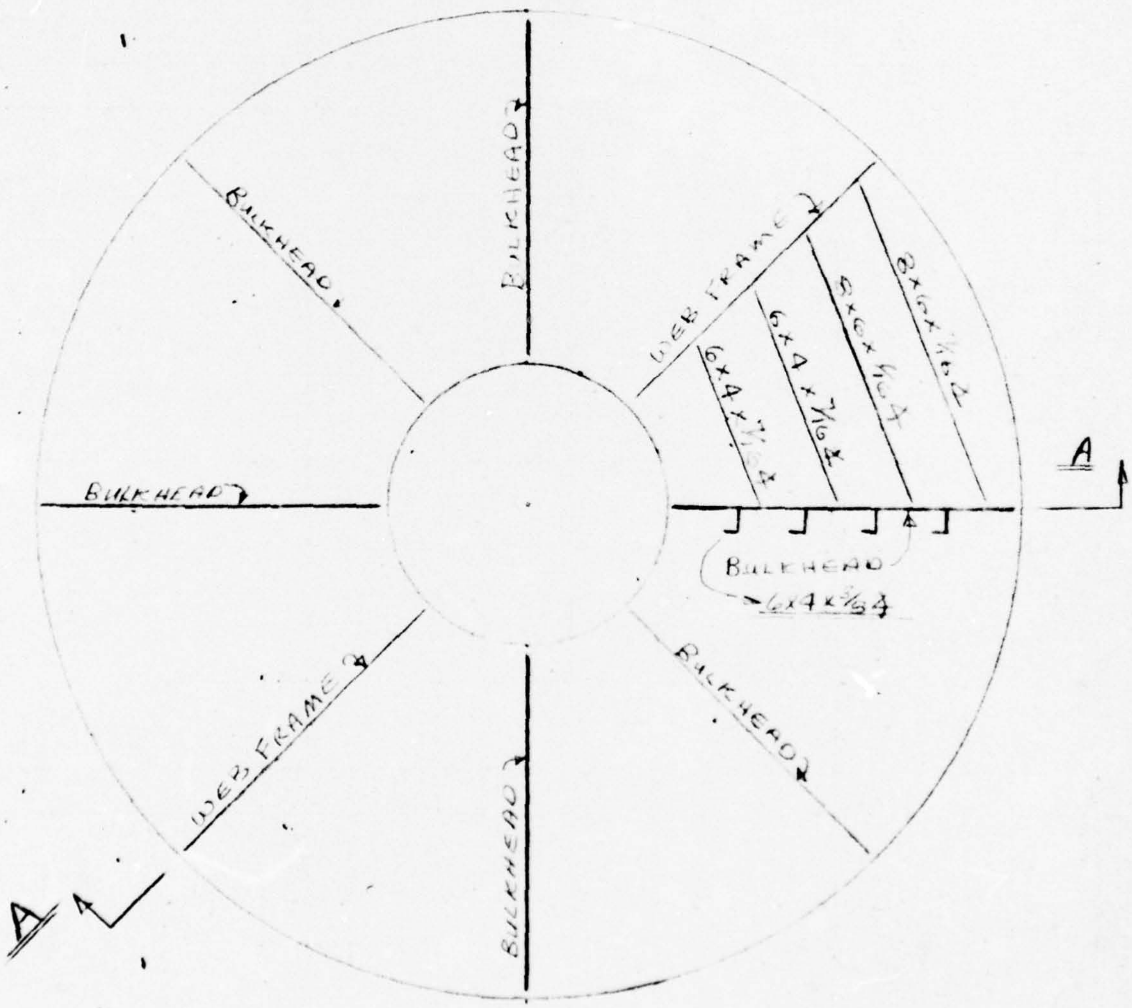
J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY / ERDL	1

SUBJECT
MONO- MOORING SYSTEM

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/20/65

DESIGN OF BUOY BOTTOM
(ASSUME DECK 4'-0" UNDER WATER)
MAX. PRESSURE = (16.5 + 4) 64 = 1310 psf = 9.1 psi



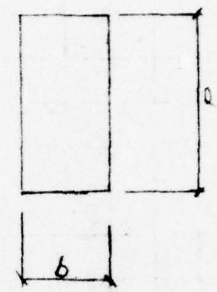
FRAMING PLAN OF BUOY BOTTOM

BODY DESIGN

DETERMINE ℞ THICKNESS (CONSIDER FIXED CONDITION)

MAX. a = <u>11.0</u> MAX. b = <u>2.1'</u> $a/b = \frac{11.0}{2.1} = \underline{5.24}$

$K_Y = \underline{.0284}$ $K_a = .250$ $K_b = \underline{.500}$



$S_a = \frac{K_a w b^2}{t^2} = \frac{.25(9.1)(25.2)^2}{(.375)^2} = \underline{10,300 \text{ psi}}$

$S_t = \frac{K_b w b^2}{t^2} = \frac{.50(9.1)(25.2)^2}{(.375)^2} = \underline{20,500 \text{psi}}$

$\text{DEF'L} = \frac{K_Y w b^4}{E t^3} = \frac{.0284(9.1)(25.2)^4}{30,000,000(.375)^3} = \underline{.0676}$

$\frac{.0676}{25.2} = \frac{1}{\underline{373}}$ O.K.

REF. <u>STEEL PLATES</u>, BETHLEHEM STEEL Co., CATALOG 234, 1948.

3/8" ℞ O.K. <u>USE 1/2" ℞ ON BOTTOM</u>

DESIGN OF RIBS (USE ∠S) ASSUME 30t FL. WIDTH

2.1(1310) = 2.75 k/l

10.6' ±

$M = 1.5(2.75)(10.5)^2 = \underline{455}^{\text{"k}}$

$S \text{ REQ'D} \approx \frac{455}{20} = \underline{23 \text{ IN.}^3}$

USE A 8×6×7/16 ∠ $\underline{S_t = 26.5}$ $\underline{S_c = 53.6}$ $\underline{I = 150.8}$

$f_t = \frac{455}{26.5} = \underline{17.1 \text{ KSI}}$ $f_c = \frac{455}{53.6} = \underline{8.5 \text{ KSI}}$

DETERMINE DEF'L.

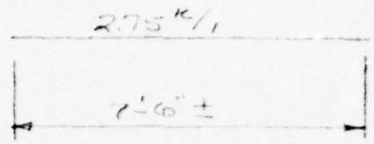
$\Delta = \frac{wL^4}{1833 I} = \frac{2.75(10.5)^4}{1,833(150.8)} = \underline{.167''} = \frac{1}{680}$

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & Co., INC.

COMPANY	SHEET NO
U.S. ARMY/ERDL	2
SUBJECT: MONO-MOORING SYSTEM	
NUMBER: JOB 5601.7 — COMPUTER: ANDREWS — CHECKED BY:	DATE: 4/21/65

DESIGN OF RIBS (CONT.)



$M = 1.5(2.75)(7.5)^2 = \underline{232}$ "k

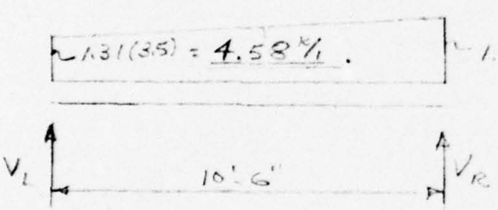
S REQD. $= \frac{232}{20} = \underline{11.6\ IN.}$

USE 6×4×5/16 ∠ $S_t = 13.8$ $S_c = 36.4$ $I = 65.1$

$f_t = \frac{232}{13.8} = \underline{16.8\ ksi}$ $f_c = \frac{232}{36.4} = \underline{6.4\ ksi}$

$\Delta = \frac{2.75(7.5)^4}{1{,}333(65.1)} = .101 = \frac{1}{\underline{742}}$ O.K.

CONSIDER WEB FRAME (DESIGN AS SIMPLE BEAM)



14.40
4.58
9.82

$V_R = \frac{4.58(10.5)}{2} + \frac{9.82(10.5)}{3} = 24.1 + 34.4$

$V_R = \underline{58.5}$ k

$V_L = 24.1 + \frac{9.82(10.5)}{6} = 24.1 + 17.2 = \underline{41.3}$ k

DETERMINE PT. OF MAX. MOMENT

$\frac{x}{10.5}(9.82)$

$4.58(x) + \frac{x}{10.5}(9.82)\frac{x}{2} - V_L = 0$

$.467x^2 + 4.58x - 41.3 = 0$ $x = \underline{5.70}$'

136
3.2
132.8

$M = 41.3(5.7) - \frac{4.58(5.7)^2}{2} - \frac{5.32(5.7)^2}{6}$

$M = 132.8$ 'k $= \underline{1{,}590}$ "k

14.4
28.8
13.2

BUOY DESIGN.

APPROXIMATE SECTION MODULUS REQUIRED

$S \approx \frac{1590}{20} = 77.5\ in^3$ USE PL AS SHOWN

$S_t = 77.68$ $S_c = 108.82$ $I = 667\ in^4$

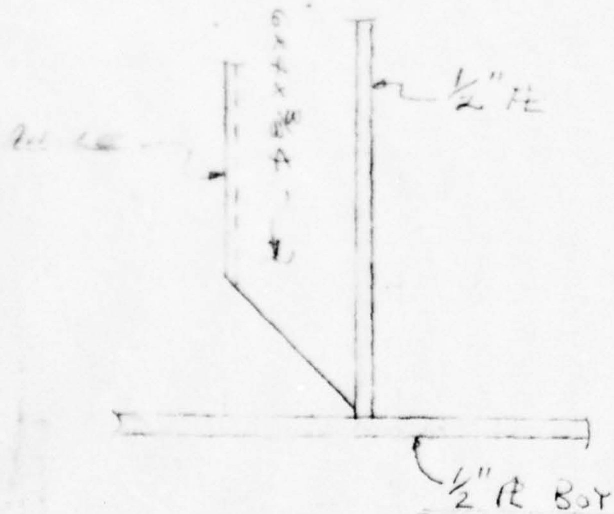
$f_t = \frac{1590}{77.68} = 19.9\ ksi$

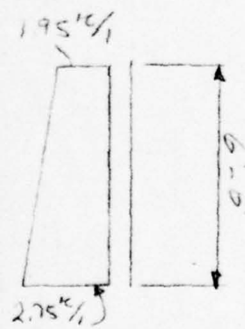
$f_c = \frac{1590}{108.82} = 14.7\ ksi$

SHEAR AREA $= 7.0"$ ALLOWABLE $V = 7.0(13) = 91^k > 58.5^k$ O.K.

USE $14 \times 9 \times \frac{1}{2}"$ PL

DIAPHRAGM BULKHEAD @ BOTTOM OF BUOY





$M \approx 1.5(2.5)(6)^2 = 135\ ''^k$

S REQ'D. $\approx \frac{135}{20} = 6.75\ in^3$

USE $6 \times 4 \times \frac{3}{8}$ L

$S_t = 12.2\ in^3$ $S_c = 35.7\ in^3$ $I = 58.9\ in^4$

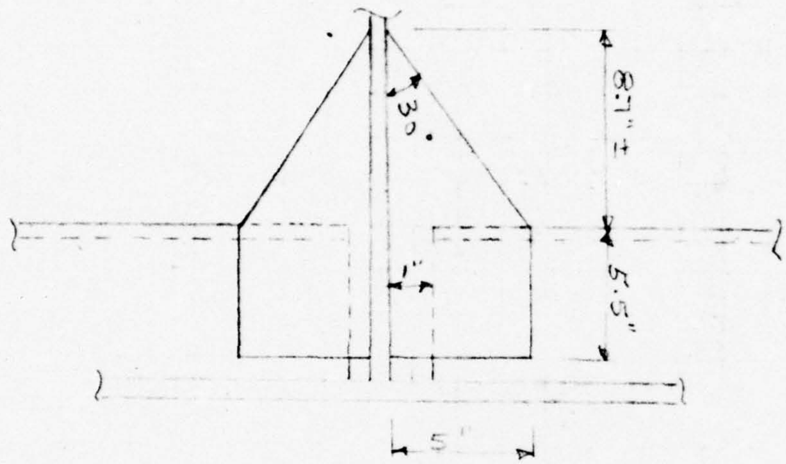
$f_t = \frac{135}{12.2} = 11.1\ ksi$ O.K.

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

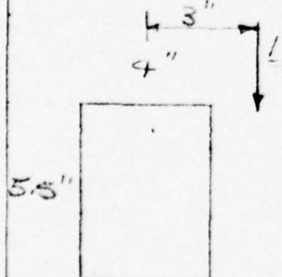
COMPANY: U.S. ARMY / ERDL	SHEET NO: 3
SUBJECT: MONO-MOORING SYSTEM	
NUMBER: JOB - 56017 · COMPUTER: ANDREWS · CHECKED BY:	DATE: 4/22/65

RIB TO BULKHEAD + RIB TO WEB FRAME CONN.



MAX. REACTION $= \frac{2.75(10.5)}{2} = 14.5^k$

USE $\frac{1}{4}$" WELD $\quad F/'' \text{ ALLOW} = .25(.707)(13.6) = 2.4^k/''$



$a = \frac{3.0}{5.5} = .545 \qquad k = \frac{4}{5.5} = .727$

$P = CDl = 1.05(4)(5.5) = 23.1^k > 14.5^k$ O.K.

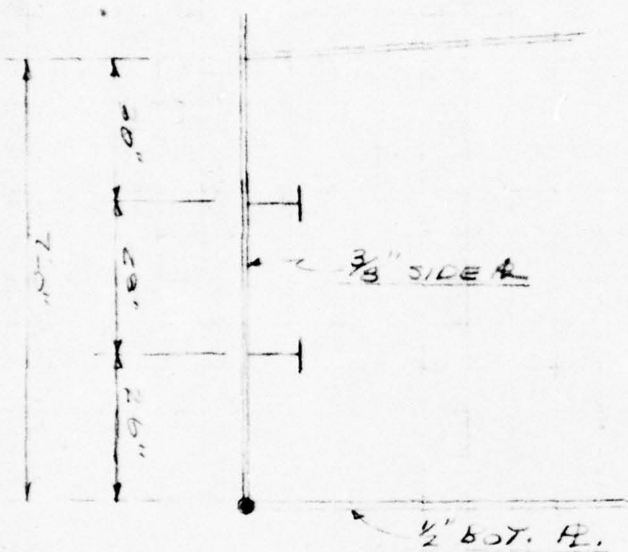
$a = \frac{3}{14.2} = .211 \qquad C = .750$

$P = CDl = .75(4)(14.2) = 42.6^k > 14.5$ OK

USE $\frac{1}{4}$" FILLET WELD

BUOY DESIGN

DESIGN OF CIRCULAR RIBS IN LOWER COMPARTMENT



DESIGN OF PL. (ASSUME RECTANGULAR - UNIFORMLY LOADED)

(CONSIDER FIXED CONDITION) REF. SEE PG. 1

$b = 24"$ $\quad a = 144"$ $\quad a/b = \frac{144}{24} = 6.0$ $\quad K_y = .0284$ $\quad K_a = .25$ $\quad K_b = .500$

TRY 3/8" PL. $\quad P_{AVG} \approx 19.0(64) = 1210$ psf $= 8.45$ psi $= w$

$f_a = \frac{K_a w b^2}{t^2} = \frac{.25(8.45)(26)^2}{(.375)^2} = 10{,}100$ psi

$f_b = \frac{K_b w b^2}{t^2} = \frac{.5(8.6)(26)^2}{(.375)^2} = 20{,}200$ psi $\approx 20{,}000$ O.K.

DEF $\quad \frac{K_y w b^4}{E t^3} = \frac{.0284(8.45)(26)^4}{30{,}000{,}000(.375)^3} = .0694" = \frac{1}{375}$

USE 3/8" PL.

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MED 14003

J. RAY McDERMOTT & CO., INC.

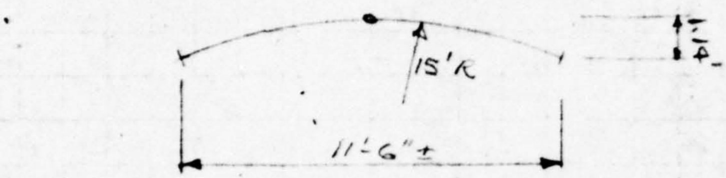
COMPANY	SHEET NO
U.S. ARMY / ERDL	4
SUBJECT	
MONO - MOORING SYSTEM	

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 55017	ANDREWS		4/22/65

DESIGN OF CIRCULAR RIBS CONT.

DESIGN AS THREE-HINGED ARCH

$\boxed{w = 1.24(2) = 2.48^{k/1}}$



$V_L = V_R = 2.48(11.5)/2 = \underline{14.25^k}$

$\text{RISE} = r - \tfrac{1}{2}\sqrt{4r^2 - C^2}$
$= 15 - \tfrac{1}{2}\sqrt{4(15)^2 - (11.5)^2}$
$= 15 - \tfrac{1}{2}\sqrt{767.75}$
$= 15 - 13.86$

$\text{RISE} = \underline{1.14'}$

$H_L - H_R = \dfrac{14.25(11.5)}{4(1.14)} = \underline{35.9^k}$

$\text{MAX. THRUST} = \sqrt{(14.25)^2 + (35.9)^2} = \underline{38.7^k}$

FIND PT. OF MAX. MOMENT

ΣM @ PT. 1 $\quad X = 30'' \quad Y = 9''$

$M = 14.25(30) - 35.9(9) - 2.48(30)^2/2$
$M = 427 - 323 - 113$
$M = \underline{-9''^k}$

ΣM @ PT. 2 $\quad X = 24'' \quad Y = 8.4''$

$M = 14.25(24) - 35.9(8.4) - 2.48(24)^2/2$
$M = 342 - 302 - 71.5$
$M = \underline{-31.5''^k}$

ΣM @ PT. 3

$M = 14.25(20) - 35.9$
$M = 285 - 270 -$
$M = \underline{-34.6''^k}$

ΣM @ PT. 4

$M = 14.25(16) - 35.9($
$M = 228 - 215 -$
$M = \underline{-18.7''^k}$

MAX. MOMENT

THRUST = $\underline{38.7^k}$

TRY $10 \times 4 \times$

$S_t = \underline{22.72}$

$P/A = \dfrac{38.7}{511} =$

$S_t = \dfrac{40}{22.72} = \underline{1.76}$

$F_a = \underline{19.03}$ ksi

UNITY CHECK

$\dfrac{7.62}{19.03} + \dfrac{1.76}{20} =$

13.86
1.14
7.71
225
4
900
900
132.25
767.75
323
113
436
427
373.5
372
31.5
302
71.5
373.5

5.16 … 59 … 11.25
11.50

215
31.7
296.7
228.0
18.7

270
49.6
319.6
295
24.6

$\boxed{11.250}$
3.64
14.86

3 $\quad x = 20'' \quad Y = 7.5''$
$(20) - 35.9(7.5) - 2.48(20)^2/2$
$- 270 - 49.6$
$6''^{K}$

4 $\quad x = 16'' \quad Y = 6''$
$16) - 35.9(6) - 2.48(16)^2/2$
$- 215 - 31.7$
$''^{K}$

ENT $\approx$ 40''K $\quad L \approx$ 70''

= 38.7K

4 x 3/8'' PL

AREA = 5.11

72 $\quad S_c = 40.48 \quad r = 4.02$

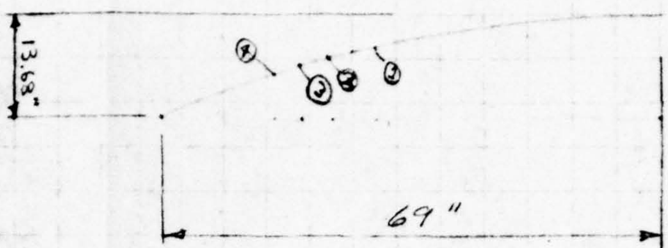
$\frac{38.7}{5.11}$ = 7.62 ksi

$\frac{}{72}$ = 1.76 ksi $\qquad L/r = \frac{70}{4.02} = 17.5$

23 ksi $\qquad F_b$ = 20 ksi

CHECK

$\frac{1.76}{20}$ = .4 + .088 = .488 < 1.0



TRY 6x4 x 3/8 PL

PL ONLY

S_c = 11.5 $\quad S_t$ = 22.7 $\quad r$ = 2.49 $\quad A$ = 3.75

$P/A = \frac{38.7}{3.61} = 10.3$ ksi

$F_c = \frac{40}{11.5} =$ 3.48 psi

$L/r = \frac{70}{2.49} =$ 28 $\qquad F_a$ = 18.48 ksi $\quad F_b$ = 20 ksi

UNITY CHECK

$\frac{10.3}{18.98} + \frac{3.48}{20}$ = 0.55 + .17 = 0.72 < 1.0

USE 6x4 x 3/8 PL

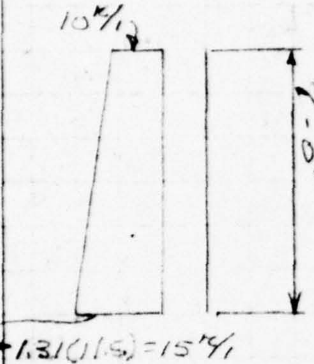
J

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO.
U.S. ARMY / EROL			5
SUBJECT: MONO-MOORING SYSTEM			
NUMBER: JOB 56017	COMPUTER: ANDREWS	CHECKED BY:	DATE: 4/23/65

DESIGN OF WEB FRAME FOR OUTSIDE



MAX. MOM. $\approx 1.5(12.5)(7)^2 = \underline{920}$ "k

S REQ'D. $\approx \frac{920}{20} = \underline{46 \text{ IN.}^3}$

TRY 13 × 8 × 3/8 PL

$S_t = \underline{49.33}$ $S_c = \underline{60.19}$ $I = 362.59$

$f_t = \frac{920}{49.33} = \underline{18.6 \text{ ksi}}$ $f_c = \frac{920}{60.19} = \underline{15.3 \text{ ksi}}$

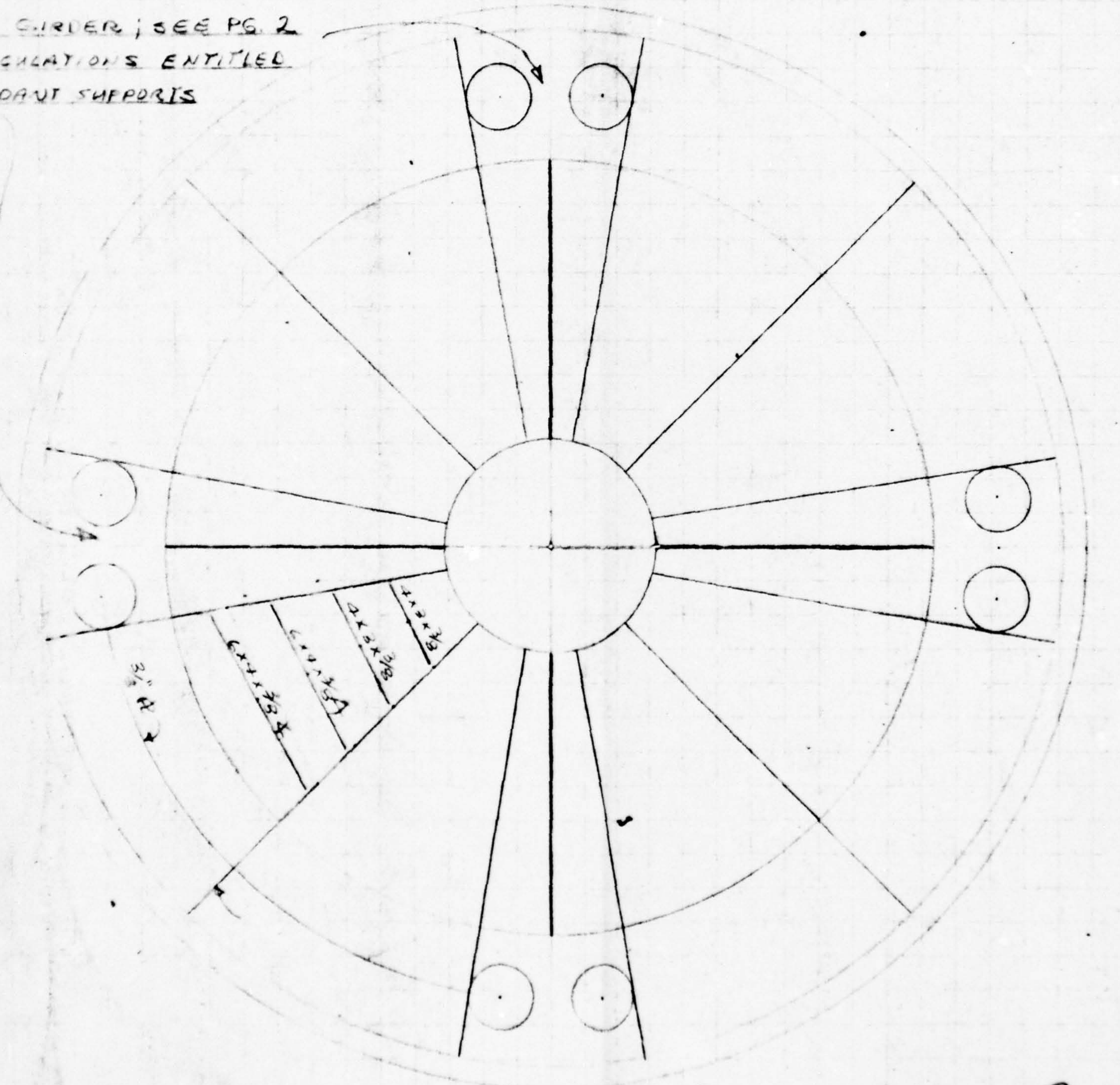
$DEF'L = \frac{wL^4}{1333\, I} = \frac{12.5(7)^4}{1,333(363)} = .0622'' = \frac{1}{1350}$

USE 13 × 8 × 3/8 PL

BUOY DESIGN

FRAMING PLAN OF MACHINERY & STORAGE COMPARTMENTS

PL GIRDER; SEE PG. 2
CALCULATIONS ENTITLED
PENDANT SUPPORTS



ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY / ERDL	6
SUBJECT	
MONO-MOORING SYSTEM	

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB - 56017	ANDREWS		4/23/65

CHECK 3/8" ℞ ON SKIRT

$a \approx 127''$ $b = 30''$ $a/b = 4.23$

$w = (20.5 - 6)64/144 = 6.45\,psi$

$K_a = 0.250$ $K_b = .500$ $K_Y = .0284$

$S_a = \frac{.25(6.45)(30)^2}{(.375)^2} = 10,300\,psi$ $S_b = 20,600\,psi$

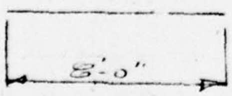
$DEF'L. = \frac{.0284(6.45)(30)^4}{30,000,000(.375)^3} = .094'' = \frac{1}{320}$

3/8" ℞ O.K. FOR SKIRT TOP & BOTTOM

USE 3/8" ℞ INSIDE FOR FLOOR OF UPPER COMPARTMENTS.

DESIGN OF ∠s SUPPORTING FLOOR OF UPPER COMPARTMENT.

$w \approx 14.5(64)2.1 = 1.95^{k}/'$



$M = 1.5(1.95)(8)^2 = 187''^{k}$

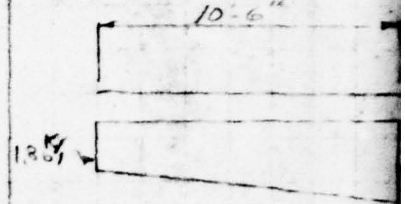
$S_{REQ'D} \approx \frac{187}{20} = 9.3\,IN.^3$

TRY 6x4x3/8 ∠

$f = \frac{187}{11.5} = 16.2\,ksi$

USE 6x4x3/8 ∠

DESIGN OF T.P. ...



MAX MOM. ≈ 1.5(4.6 ...

S REQ'D. = 775/20 ...

TRY 11x8x3/8 ...

$S_c = 45.06$ ...

$f_c = \frac{775}{45.06} = 17.1\,k$ ...

USE 11x8x3/8 ℞ ...

CHECK ... STIFFNERS ...

CONSIDER CASE 9 ...
AND STRAIN ...
ASSUME ...
NO FORCES = ...

$S = \frac{bd^2}{6} = \frac{12(.375)^2}{6} = .282$ ...

NEED STIFF ...

$20.5(64) = 1.31$

$CIR. = 3.14(8.5) = 26.7$ $\quad \frac{1.31(26.7)}{18} = 1.94^{K}$

$180^\circ = 57.26$

$\frac{10}{180}(57.26) = 3.18$

BODY DESIGN

OF TOP OF WEB FRAME

$\approx 1.5(4.63)(10.5)^2 = \underline{775}^{\prime\prime K}$

$\approx \frac{775}{20} = \underline{33.7\ IN.^3}$

8 x 3/8 PL

$S_t = 19.99$ $\quad I = 251.33$

$= 19.1\ KSI$

9 x 3/8 PL

INSIDE WELL WITH NO ... (TRY 3/8" PL)

CASE 9 PG 153 IN STRESS ... IN B. ... MARK

$\theta = \ldots$ $\quad 2\theta = 20^\circ$

$s = \ldots = 18$ $\quad F = \frac{1.31(26.7)}{18} = \underline{1.94}^{K}$

$MAX.\ M = \frac{1}{2} WR\left(\frac{1}{s} - \frac{1}{\theta}\right)$

$= \frac{1}{2}(1.94)(51)\left(\frac{1}{.174} - \frac{1}{3.18}\right)$

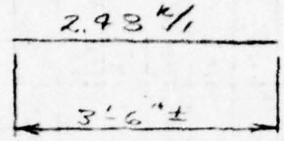
$MAX\ M = .5(.194)(51)(5.44) = \underline{26.9}^{\prime\prime K}$

$= 282\ IN$ $\quad f = \frac{26.9}{.282} = \underline{95.4\ KSI}$

STIFFNERS

DESIGN OF STIFFNERS FOR WELL

(DESIGN AS SIMPLE BEAM)



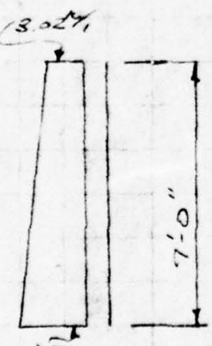
$M = 1.5(2.48)(3.5)^2 = \underline{45.6}^{\prime\prime K}$

$S\ REQ'D. \approx \frac{45.6}{20} = \underline{2.3\ IN^3}$

USE 4 x 3 x 3/8 PL $\quad S = \underline{5.3\ IN.^3}$ $\quad S = \underline{10.3\ IN.^3}$ $\quad I = \underline{15.1\ IN.^4}$

O.K. BY INSPECTION

DESIGN OF WEB FRAME FOR INTERIOR WELL



$MAX.\ MOM. \approx 3.82(1.5)(7)^2 = \underline{281}^{\prime\prime K}$

$S\ REQ'D. \approx \frac{281}{20} = \underline{14.1\ IN.^3}$

TRY 7 x 4 x 3/8 PL

$S_t = \underline{14.1}$ $\quad S_c = \underline{27.0}$ $\quad I = \underline{68.2}$

$f = \frac{281}{14.1} = \underline{19.9}\ KSI$

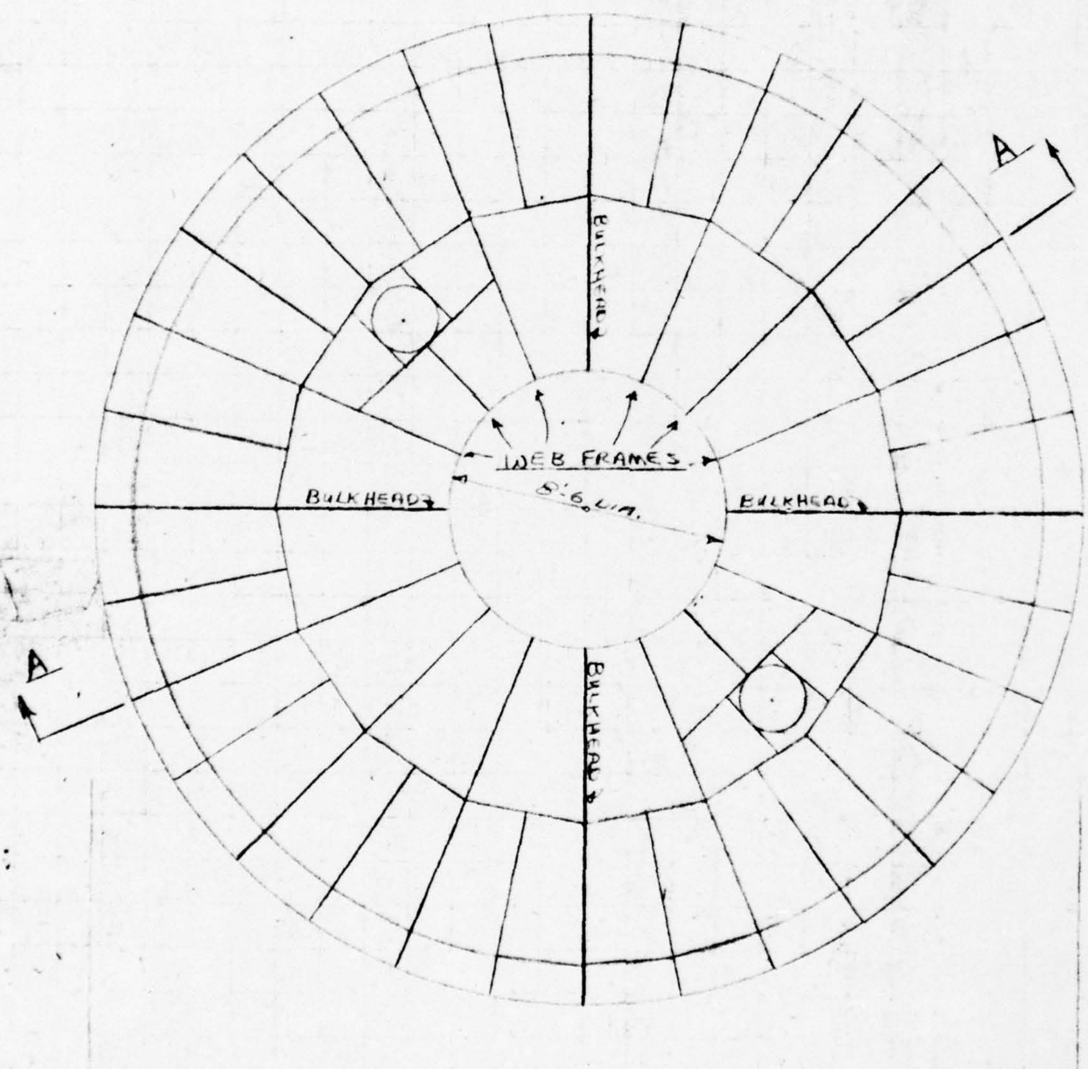
USE 8 x 4 x 3/8 PL $\quad$ O.K. BY INSPECTION

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & Co., INC.

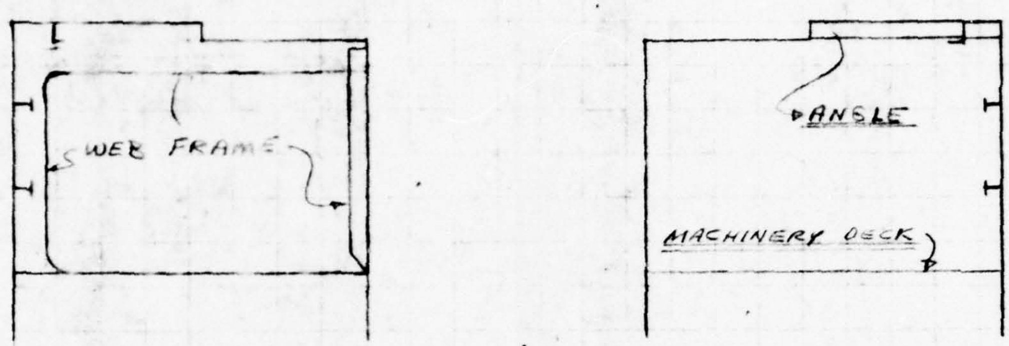
COMPANY: U. S. ARMY/EROL
SHEET NO: 7
SUBJECT: MONO-MOORING SYSTEM
DRAWING NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 4/26/65

DESIGN OF TOP OF BUOY



FRAMING PLAN
SCALE 3/16" = 1'-0"

BUOY DESIGN



SECTION A-A
3/16" = 1'-0"

LOADS ON BUOY TOP

HYDROSTATIC PRESSURE ≈ 6(64)/144 = 2.67 psi

REACTION FROM "A"-FRAME - - - 41^k/LEG = 20.5^k/WHEEL

MOORING LOAD (VERTICAL COMP.) - - 195^k = 32.5^k/WHEEL

WT. OF DECK - - - - - - - - - - 20^k ±

CHECK 3/8" PL

MAX a ≈ 60" b ≈ 45" a/b = 1.33

K_y = .0237 K_a = .250 K_b = .462

$$S_b = \frac{.462(2.67)(45)^2}{(.375)^2} = 17{,}800 \text{ psi} \quad \text{O.K.}$$

3/8 PL OK FOR TOP

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / EROL
SHEET NO: 8
SUBJECT: MONO-MOORING SYSTEM
DRAWING NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 4/26/65

CHECK WHEEL SUPPORT FOR REACTION FROM "A" FRAMES.

$25^{k}\pm$

3'-0"

$M = 3PL = 3(25)(3) = \underline{225''^{k}}$

TRY $8 \times 4 \times \frac{7}{16}$" ∠

$S_t = \underline{19.0}$ $S_c = \underline{32.2}$ $\underline{I = 10.2}$

$f = \frac{225}{19} = \underline{11.8 \text{ KSI}}$

$DEF'L. = \frac{PL^3}{83EI} = \frac{25(3)^3}{83.7(10.2)} = \underline{.00794"}$

CHECK SUB-ANGLE SUPPORT

1.25' 50^{k}

.385(2.75) = 1.06 k/'

5.5'

$V_L = \frac{1.06(5.5)}{2} + \frac{50(4.25)}{5.5}$

$V_L = 2.91 + 38.6 = \underline{41.50^{k}}$

$M = 41.50(1.25) - 1.06(1.25)^2/2$

$M = 41.5 - .83$

$M \approx 41'^{k} = \underline{492''^{k}}$

TRY $10 \times 6 \times \frac{3}{8}$ PL

$S_t = \underline{29.19 \text{ IN.}^3}$

$f = \frac{492}{29.19} = \underline{16.9 \text{ ksi}}$

USE $10 \times 6 \times \frac{3}{8}$ PL

2.91
38.6
41.51

2.91
19.3
21.21

8.5

1.9
11.9
14.3^{k}

DESIGN OF STEP-D

14.3^{k}

3.5'

$M \cdot 30L = 3$

S REQ'D

CHECK AS $6 \times 9 \times \frac{3}{8}$

$f = \frac{150}{11.5} = \underline{13.0 \text{ ksi}}$

$\frac{3}{8}$ PL AS STEP O.K.

DESIGN OF WEB

$15^{k}\pm$

TOP

.385(9) = 3.5 k/' 1.5 k/'

10.5'

$M = 15.35(5.25) - \frac{.35(5}{2}$

$M = 80.5 - 20.5 =$

TRY $12 \times 6 \times \frac{3}{8}$ PL =

$f_t = \frac{720}{38.35} = 18.8$

USE $12 \times 6 \times \frac{3}{8}$ M

$13.5(64)(6) = 5.18^{k}/_{1}$ $6(64)(6) = 2.3^{k}/_{1}$

$$\begin{array}{r} 1.75 \\ .77 \\ \hline .98 \end{array} \quad \begin{array}{r} 77 \\ 49 \\ \hline 126 \end{array} \quad \begin{array}{r} 5.18 \\ 2.30 \\ \hline 2.88 \end{array} \quad \begin{array}{r} 2.30 \\ 1.44 \\ \hline 3.74 \end{array}$$

BODY DESIGN

5'

N OF STEP-DOWN

4.3^{k}

$M \approx 3 P L = 3(14.3)(3.5) = \underline{150''^{k}}$

S REQ'D $= \frac{150}{20} = \underline{7.5 IN^3}$

AS $6 \times 4 \times \frac{3}{8}$ ∠

$\frac{0}{5} = \underline{18.0 \text{ ksi}}$

S STEP OK

N OF WEB FRAMES

15^{k}

$.85(7) = 1.5^{k}/_{1}$

$V_L = V_R = 7.5 + 7.85$

$10.5'$

$V_L \approx V_R \approx \underline{15.35^{k}}$

$35(5.25) - \frac{.5(5.25)^2}{2}$

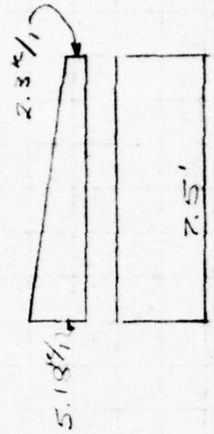
$0.5 - 20.5 = 60^{k} = \underline{720''^{k}}$

$12 \times 6 \times \frac{3}{8}$ PL

$\frac{720}{38.33} = \underline{18.8 \text{ ksi}}$

$12 \times 6 \times \frac{3}{8}$ MIN DEPTH

OUTSIDE



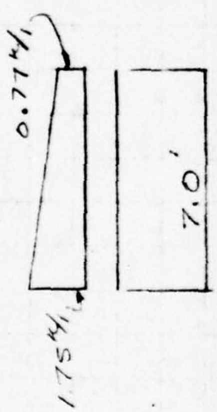
$M \approx 1.5(3.74)(7.5)^2 = \underline{315''^{k}}$

TRY $10 \times 4 \times \frac{3}{8}$ PL

$f = \frac{315}{22.72} = \underline{14 \text{ ksi}}$

USE $10 \times 4 \times \frac{3}{8}$ PL

INSIDE



$M \approx 1.5(1.26)(7.0)^2 = \underline{92.5''^{k}}$

TRY $6 \times 4 \times \frac{3}{8}$ ∠

$f = \frac{92.5}{11.5} = \underline{8.04 \text{ ksi}}$

USE $6 \times 4 \times \frac{3}{8}$ ANGLE

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ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

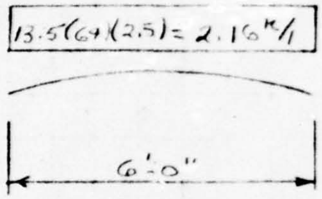
J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
U.S. ARMY/ERDL			9
SUBJECT			
MONO-MOORING SYSTEM			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/27/65

DESIGN OF RIB FRAMES

NOTE: NO RIBS ARE REQUIRED FOR INTERIOR WELL SINCE BULKHEADS & WEB FRAMES ARE APPROX. 2'-0" O.C.

OUTSIDE RIBS (DESIGN AS STRAIGHT BM)



$M = 1.5(2.16)(6)^2 = 117''^k$

TRY 5x3x3/8 ∠

$f = \frac{117}{7.5} = 15.6$ KSI

USE 5x3x3/8 ∠

CHECK 3/8 ℞ FOR OUTSIDE BUOY HULL

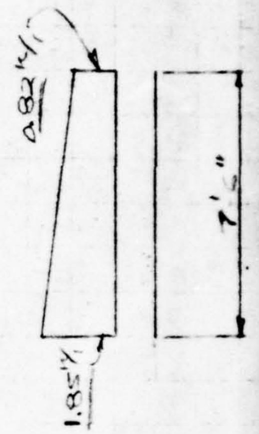
$w = 13.5(64)/144 = 6$ psi $a = 72"$ $b = 30"$ $a/b = 2.4$

$K_y = 0.0280$ $K_a = .250$ $K_b = 0.497$

$S_b = \frac{K_b w b^2}{t^2} = \frac{.497(6)(30)^2}{(.375)^2} = 17{,}200$ psi

3/8" ℞ O.K. FOR BUOY HULL

DESIGN OF
UPPER BU



DESIGN OF

MAX. SPAN

W = 15.0 P

M = 1.5(.75

TRY 6x4

$f = \frac{47}{3.3} =$

FRAME W

1.85   .82
.82   .52
1.03   1.34

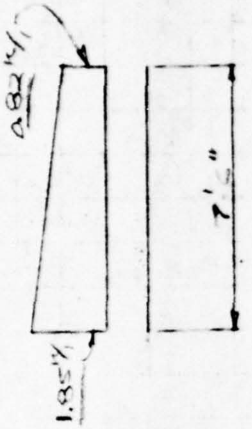
CO., INC.

SHEET NO 9

DATE 4/27/65

BUOY DESIGN

DESIGN OF ∠ SUPPORTS FOR UPPER BULKHEAD



$M = 1.34(1.5)(7.5)^2 = \underline{114}''^K$

TRY 6×4×3/8 ∠

$f = \frac{114}{11.5} = \underline{9.9 KSI}$

USE 6×4×3/8 ∠

Y. BM.)

''K

DESIGN OF PLATFORM

MAX. SPAN OF ∠ ≅ 8' SPC. ≅ 3'

W ≅ 150 PSF

$M = 1.5(.45)(8)^2 = \underline{44}''^K$

TRY 6×4×3/8" ∠

$f = \frac{44}{3.3} = 13.3 KSI$

FRAME WITH 6×4×3/8 ∠S & GRATING

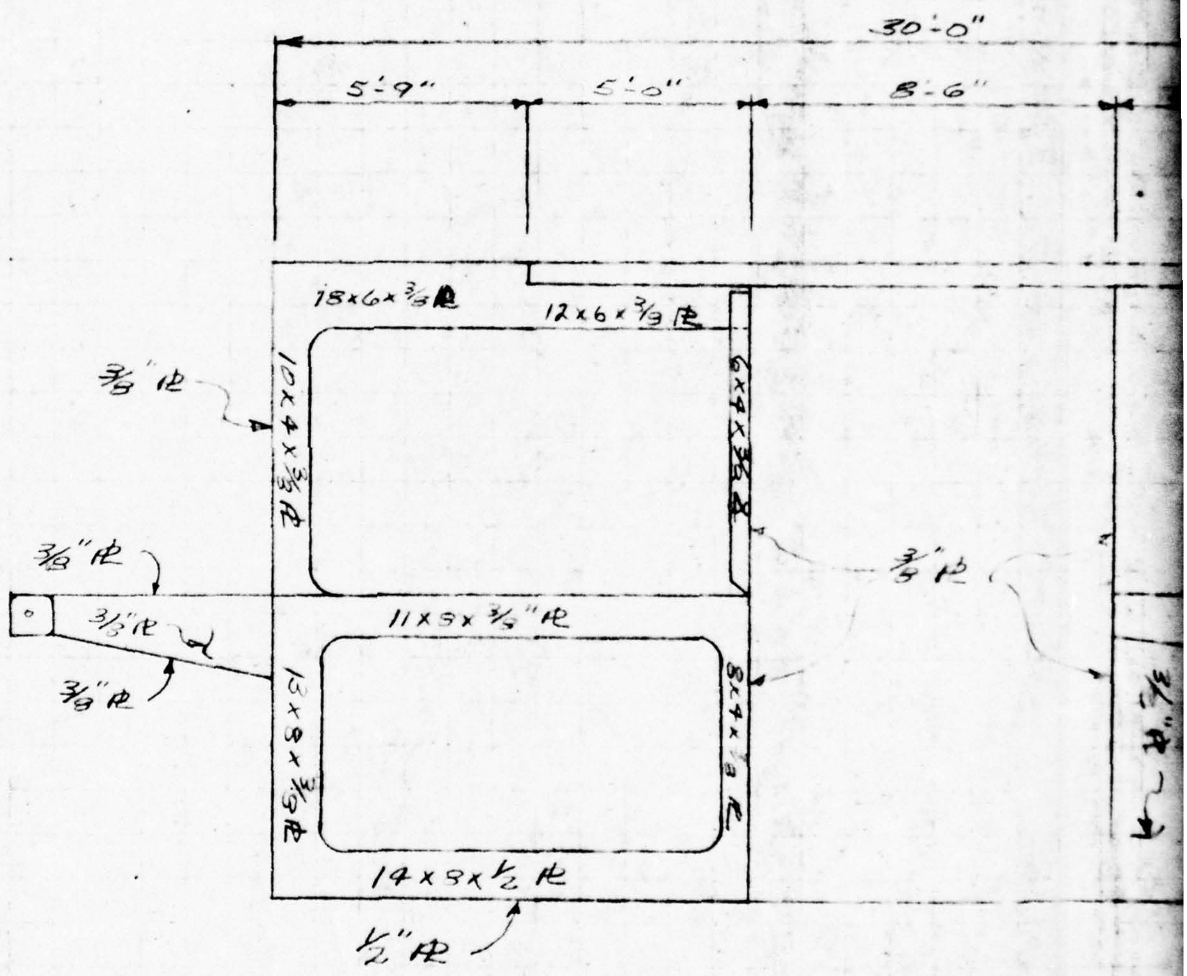
ULL

0" 3/0 = 2.4

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

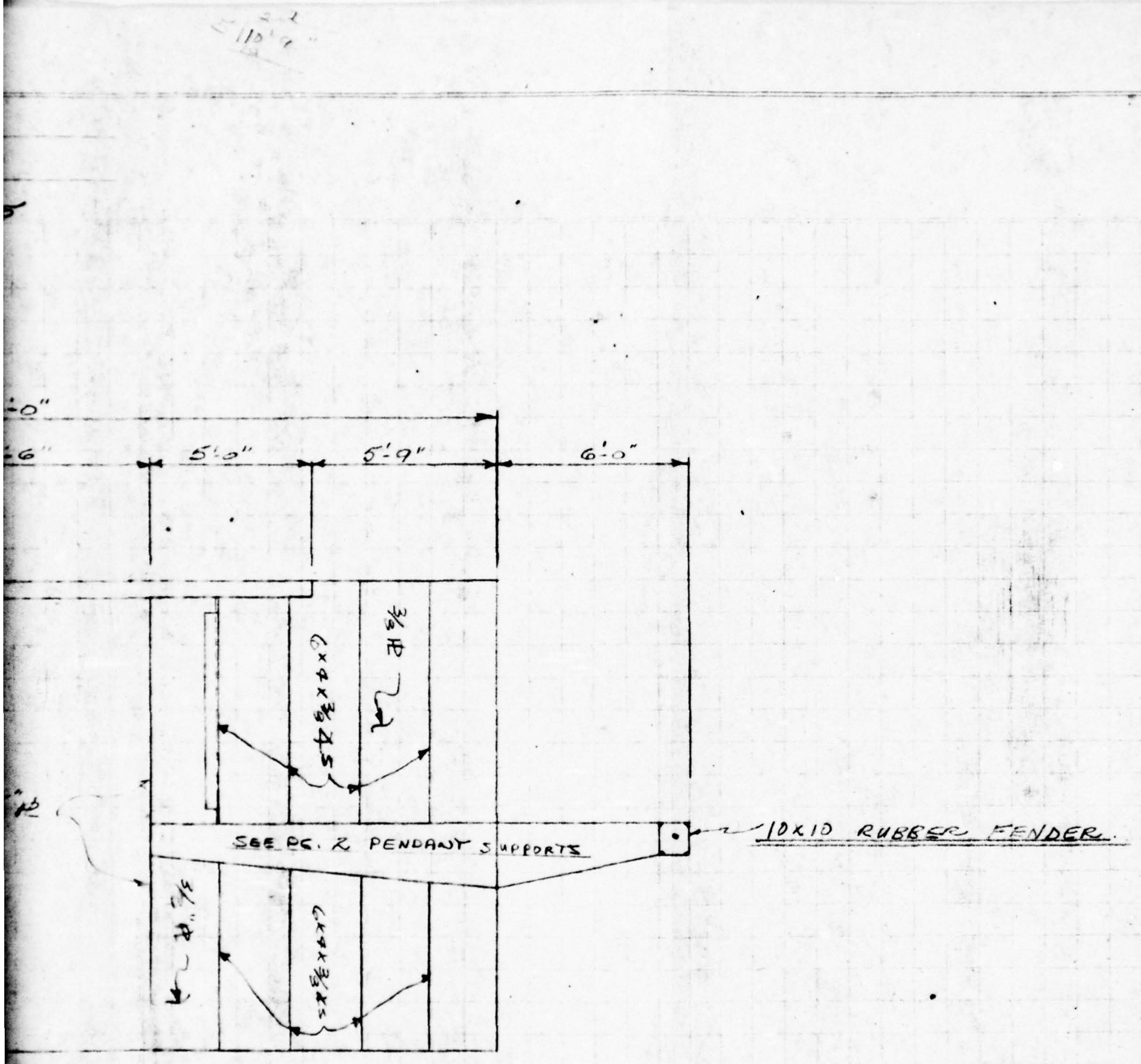
J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
U. S. ARMY / ERDL			10
SUBJECT: MONO-MOORING SYSTEM			
DRAWING NUMBER: JOB - 56017	COMPUTER: ANDREWS	CHECKED BY:	DATE: 4/27/65



SECTION THRU BUOY SHOWING TYP
AND BULKHEAD FRAMING

SCALE 1/4" = 1'-0"



OWING TYPICAL WEB FRAME

1'-0"

DESIGN OF:

A-FRAME

ROTATING DECK

BOGIE RACEWAYS

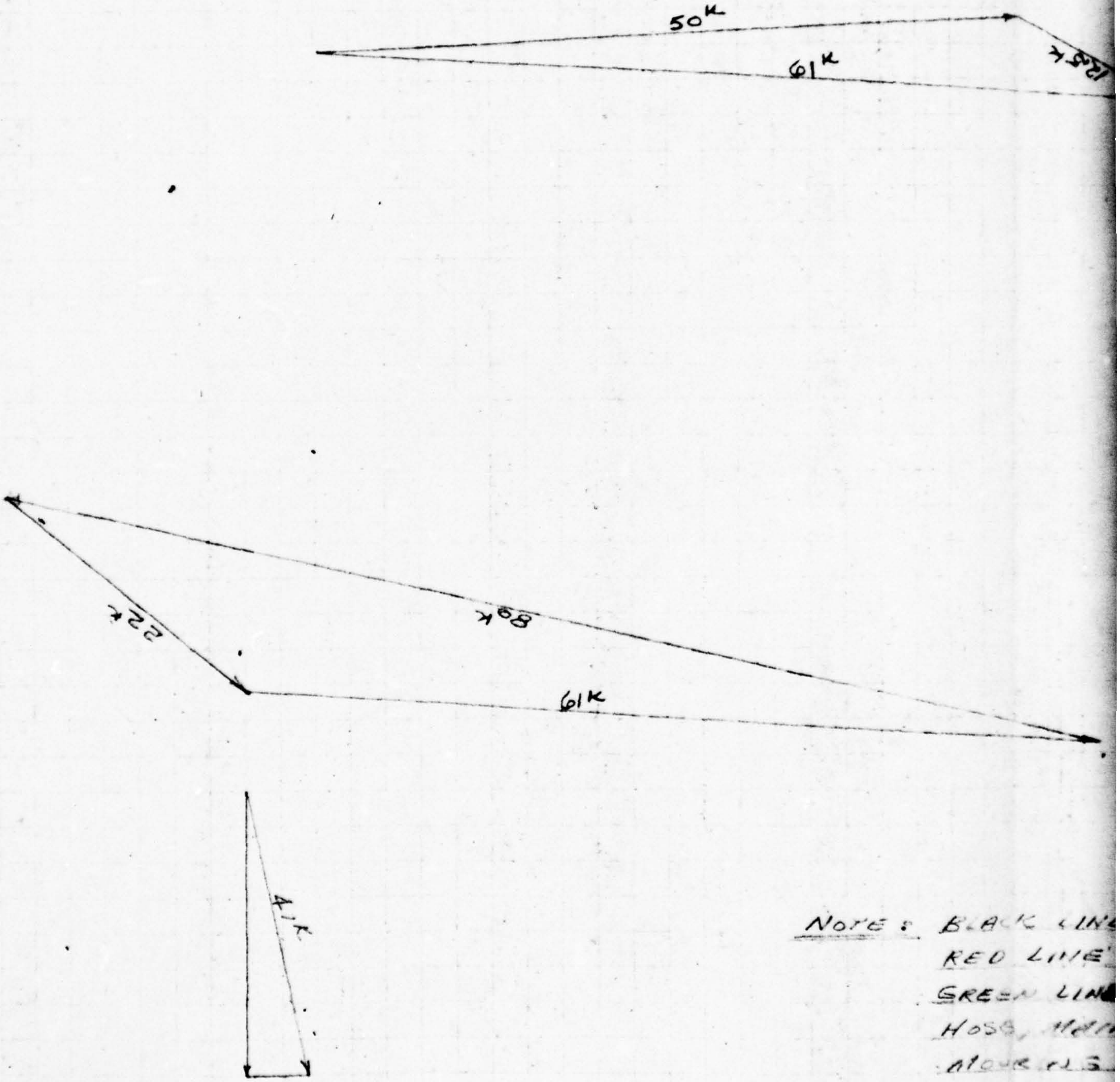
BOGIE WHEEL SUPPORTS

ENGINEERING DEPARTMENT
COMPUTATION SHEET

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO.
U.S. ARMY / ERDL	1

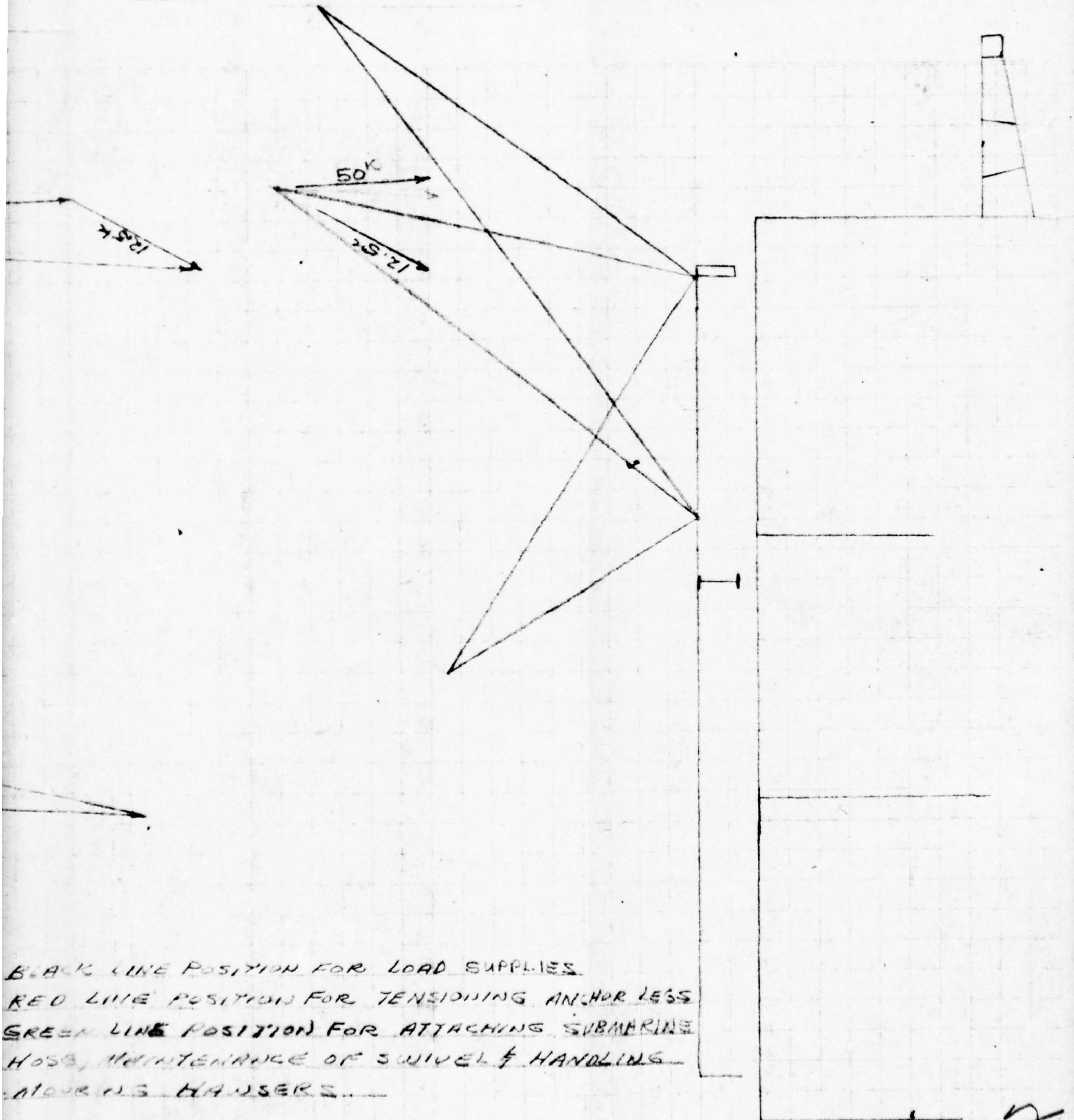
SUBJECT			
MONO-MOORING SYSTEM			
NUMBER	COMPUTER	CHECKED BY	DATE
JOB - 56017	ANDREWS		3/29/65



NOTE: BLACK LINE
RED LINE
GREEN LINE
HOSE, MOOR
MOOR ALS

MAX. F/LEG = 41K C   MAX. TENSION/LEG ≈ 12K T

"A" FRAME & ROTATING DECK DESIGN.



BLACK LINE POSITION FOR LOAD SUPPLIES
RED LINE POSITION FOR TENSIONING ANCHOR LESS
GREEN LINE POSITION FOR ATTACHING SUBMARINE
HOSE, MAINTENANCE OF SWIVEL & HANDLING
MOORING HAWSERS.

T

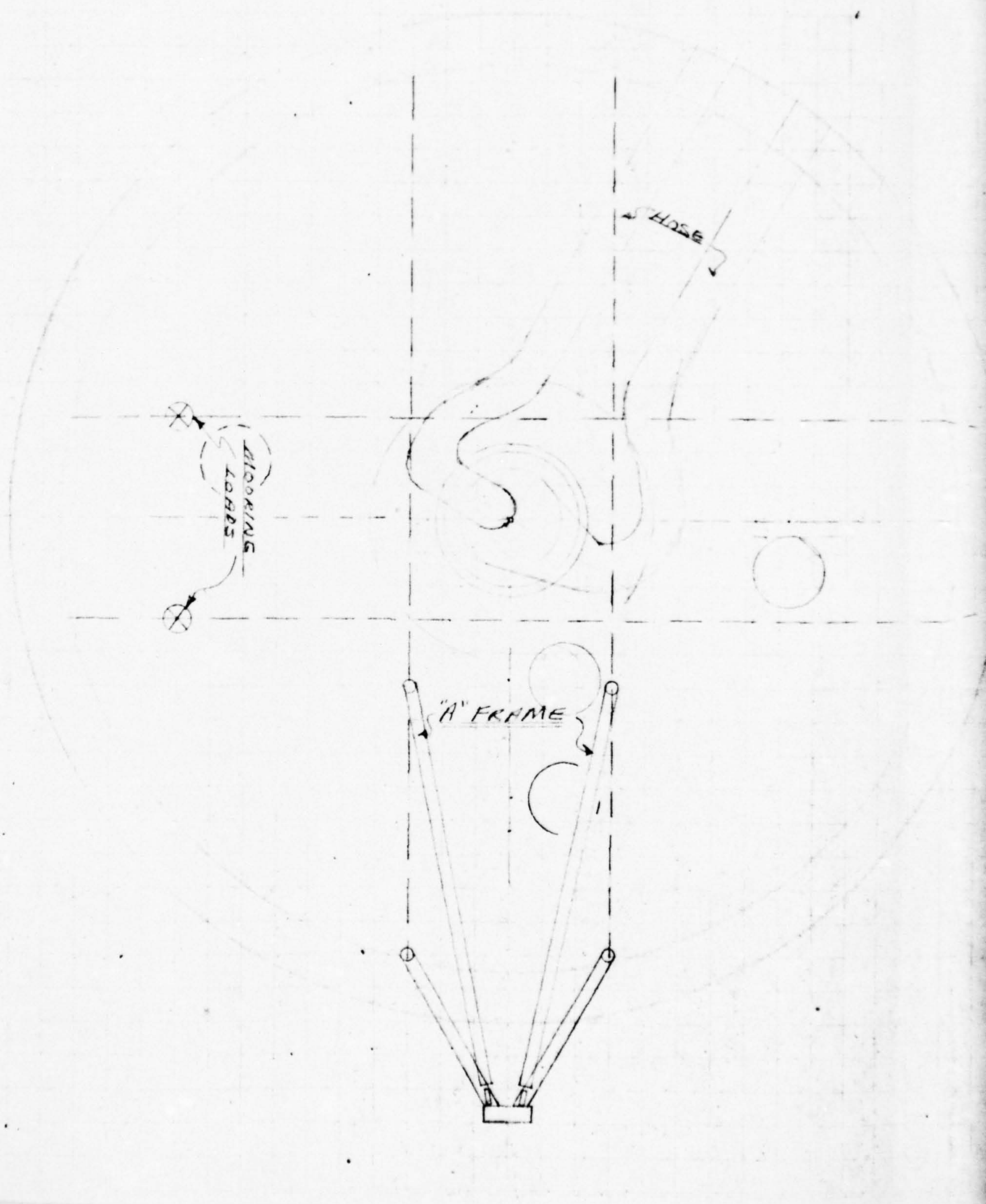
ENGINEERING DEPARTMENT
COMPUTATION SHEET

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY / EROL	2

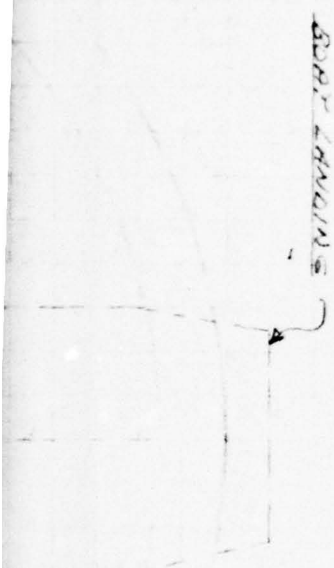
SUBJECT: MONO - MOORING SYSTEM

NUMBER	COMPUTER	CHECKED BY	DATE
JOB - 56017	ANDREWS		3/30/65

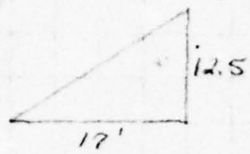


299 + 156 = 445   445 + 9 = 454   156 + 81 = 237   237 − 164 = 68   681 − 5? = 93

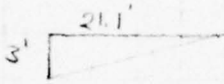
237 + 9 = 246   93 + 9 = 102



DETERMINE ANGLE CHANGE OF BACKSTAYS IN MOVING FROM BLACK LINE TO RED LINE POSITION.



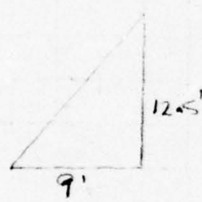
$$\sqrt{(17)^2 + (12.5)^2} = \underline{21.1'}$$



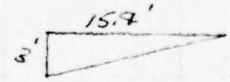
$$\text{TRUE LENGTH} = \sqrt{(3)^2 + (21.1)^2} = \underline{21.3'}$$

$$\tan\theta = \frac{3}{21.1} = .142$$

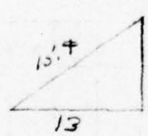
$$\theta = \underline{8.1^\circ}$$



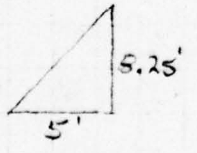
$$\sqrt{(9)^2 + (12.5)^2} = \underline{15.4'}$$



$$L = \underline{15.69'}$$



$$\sqrt{(15.4)^2 - (13)^2} = \underline{8.25'}$$



$$\sqrt{(8.25)^2 + (5)^2} = \underline{9.64'}$$

$$\sqrt{(3)^2 + (9.64)^2} = \underline{10.1'}$$

$$\tan\theta = \frac{3}{9.69} = .312$$

$$\theta = \underline{17.3^\circ}$$

$\angle$ CHANGE IS FROM 8.1° TO 17.3°

USE A BALL JOINT CONNECTION TO ALLOW FOR $\angle$ CHANGE.

ENGINEERING DEPARTMENT
COMPUTATION SHEET

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY / ERDL	3

SUBJECT			
MONO-MOORING SYSTEM			
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		3/30/65

PRELIMINARY DESIGN OF LEGS FOR "A" FRAME

MAX. COMPRESSION IN FRONT LEGS = 41^k L = 15.69'

TRY 6 ϕ .250 r = 2.26

$L/r = \frac{15.69(12)}{2.26} = 83.2$. $F_a = 14.03$ ksi

$P_{ALLOWABLE} = 14.03(5.01) = 70.4^k > 41^k$ O.K.

MAX. TENSION IN BACKSTAYS ≈ 12^k L ≈ 21.3'

AREA REQ'D: $\approx \frac{12}{20} = .6 \square''$

USE THREE SIZES OF TELESCOPING PIPE

SAY! 6 ϕ .25 ; 5 ϕ .258 ; 4 ϕ .250 (NOMINAL SIZES)

ENGINEERING DEPARTMENT
COMPUTATION SHEET

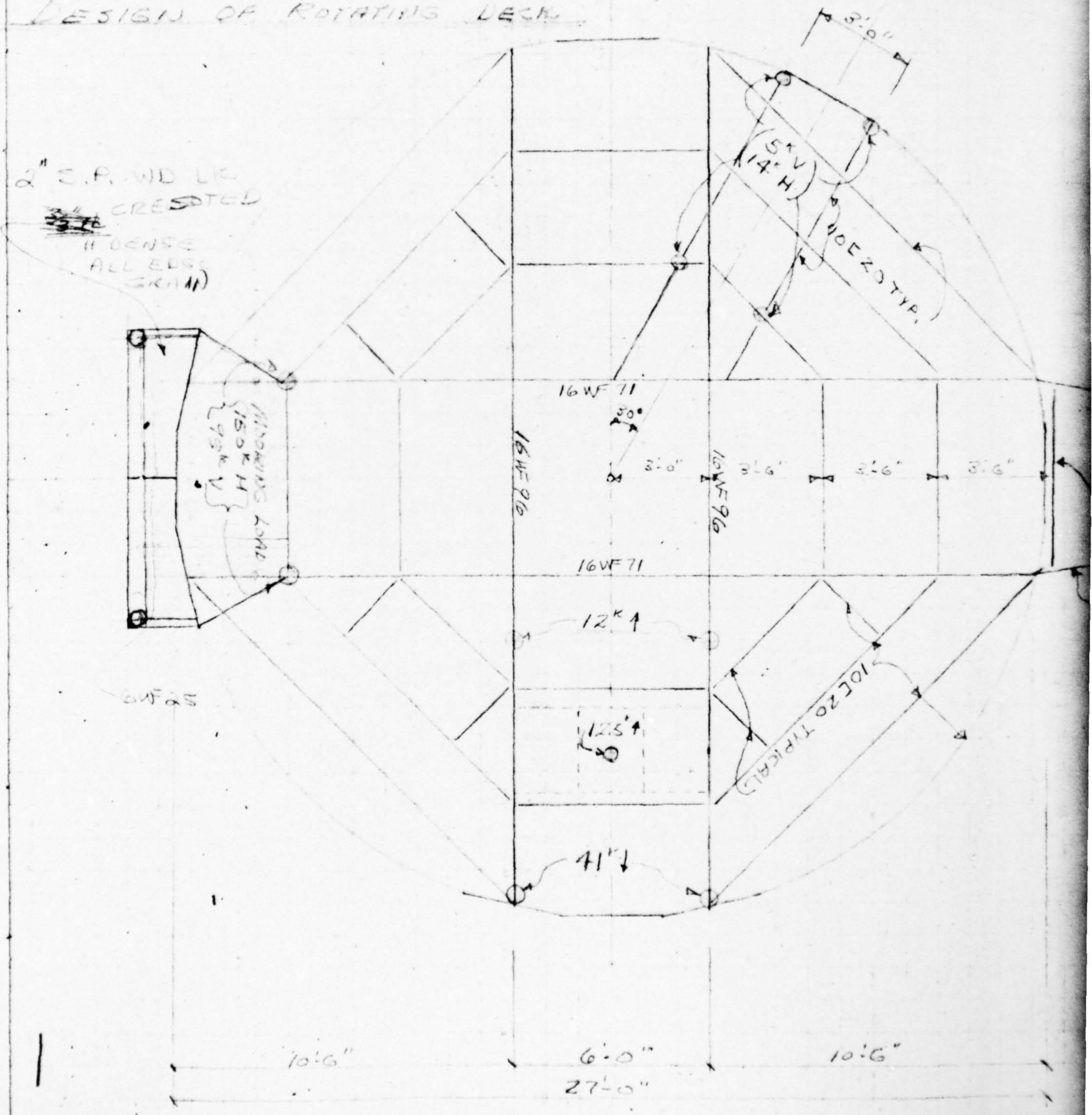
J. RAY McDERMOTT & Co., INC.

COMPANY	SHEET NO
U.S. ARMY / ERDL	4

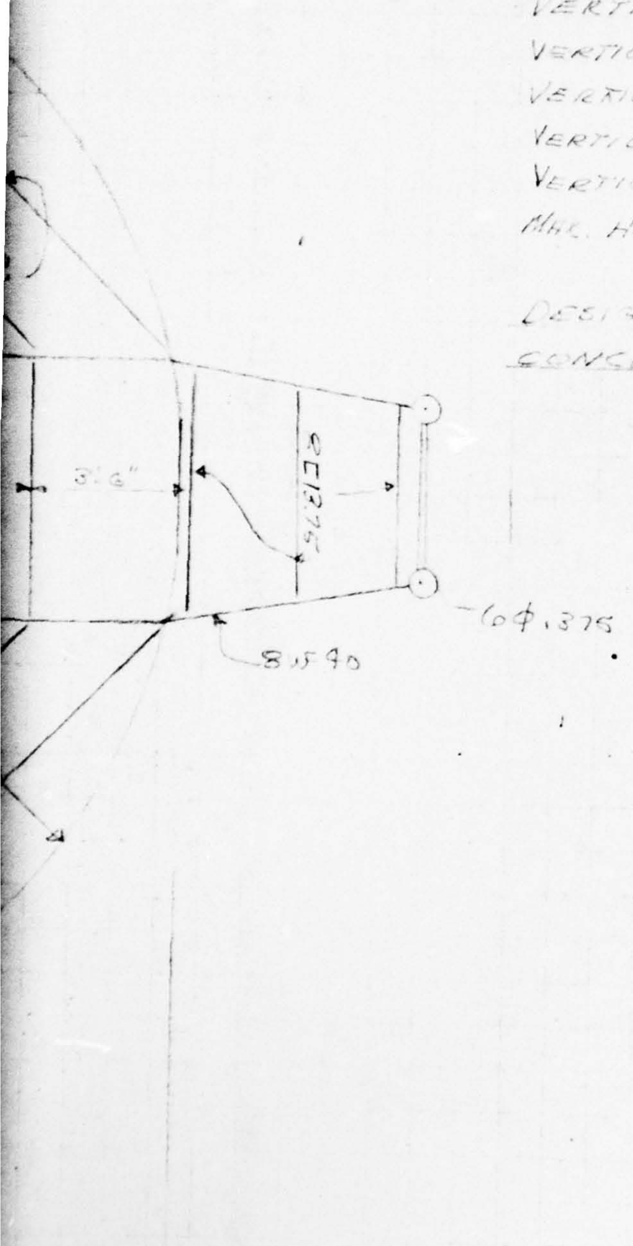
SUBJECT: MONO-MOORING SYSTEM

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		8/30/65

DESIGN OF ROTATING DECK



ROTATING DECK



DESIGN LOADS

HORIZONTAL MOORING LOAD - - - - - 300^K →
VERTICAL MOORING LOAD - - - - - - 196^K ↑
VERTICAL REACTION FORWARD LEG "A" FRAME - - 41^K ↓ /LEG
VERTICAL REACTION BACK LEG "A" FRAME - - 12^K ↑ /LEG
VERTICAL REACTION FROM WINCH - - - - 12.5^K ↑
VERTICAL REACTION FROM PIPES - - - - - 2.0^K ↓/SUPPORT
MAX. HORIZONTAL THRUST FROM PIPES - - - - - 14^K/SUPPORT

DESIGN ENTIRE DECK AREA FOR 150 psf PLUS CONCENTRATED LOADS AS SHOWN ABOVE.

7

ENGINEERING DEPARTMENT
COMPUTATION SHEET

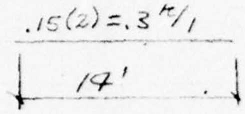
J. RAY McDERMOTT & Co., INC.

MCD 14003

COMPANY	SHEET NO
U.S. ARMY / ERDL	5
SUBJECT	
MONO-MOORING SYSTEM	

~~DRAWING~~ NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		3/31/65

DESIGN OF SUB-BEAMS



$M = 1.5(.3)(14)^2 = \underline{88.2}\ ''^{k}$

TRY 8 B 10

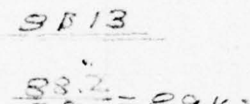
$f = \dfrac{88.2}{7.8} = 11.3\ ksi$

$F_b = \dfrac{12{,}000}{Ld/Af} = \dfrac{12{,}000}{14(12)(9.83)} = 7.26\ ksi < 11.3$ NO GOOD

TRY 8 B 13

$f = \dfrac{88.2}{9.9} = \underline{8.9\ ksi}$ $\quad F_b = \dfrac{12{,}000}{14(12)(7.87)} = \underline{9.1\ ksi}$ O.K.

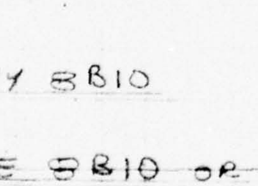
~~USE 8 B 13 OR 9 ⊏ 13.4~~ NOTE: USE 10⊏20 TO HOLD MIN. PL THICKNESS TO 3/8" FOR HARD TO REPLACE ITEMS.



$M = 1.5(.375)(10)^2 = \underline{56}\ ''^{k}$

TRY 8 B 10 $\quad f = \dfrac{56}{8.1} = \underline{6.9\ ksi}$

~~USE 8 B 10 OR 8 ⊏ 11.5~~ NOTE: USE 10⊏20 (SEE ABOVE NOTE)

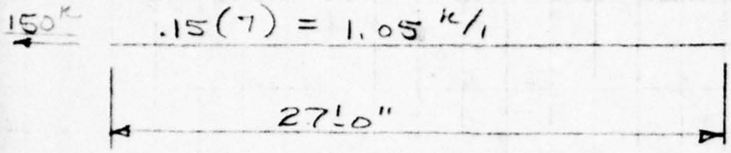


$M = 3PL = 3(5)(5) = \underline{75}\ ''^{k}$

~~USE 8 ⊏ 11.5 OR 8 B 10~~ NOTE: USE 10 ⊏ 20 (SEE ABOVE NOTE)

ROTATING DECK

DESIGN OF MAIN CROSS BEAMS



$M = 1.5(1.05)(27)^2 = \underline{1{,}150}\ ''^{k}$

MAX. MOMENT = $\underline{1150}\ ''^{k}$ AXIAL FORCE = $\underline{150^{k}}$

TRY 16WF71

$f = \frac{1150}{115.9} = \underline{10\ ksi}$ $\quad P/A = \frac{150}{20.86} = \underline{7.2\ ksi}$

CHECK DEFLECTION

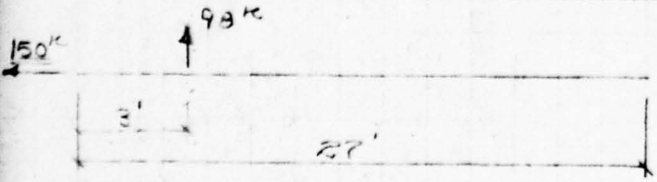
$\Delta = \frac{wl^4}{1{,}333 I} = \frac{1.05(27)^4}{1{,}333(936.9)} = \underline{0.445''} \quad = \frac{1}{727}$

CHECK HORIZONTAL SHEAR

MAX. ALLOWABLE SHEAR = $\underline{114^{k}}$ < 98^{k} O.K.

BEARING LENGTH REQ'D = $\underline{6''}$

CONSIDER CONCENTRATED LOAD



$V_L = \frac{24}{27}(98) = \underline{87^{k}}$

$M = 87(3)(12) = \underline{3{,}130}\ ''^{k}$

TRY 16WF71

$f = \frac{3130}{115.9} = \underline{27\ ksi}$ $\quad P/A = \frac{150}{20.86} = 7.2\ ksi$

16WF71 NO GOOD FOR BEAMS CARRYING MOORING LOAD

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / ERDL | SHEET NO.: 6

SUBJECT: MONO-MOORING SYSTEM

JOB NUMBER: 56017 | COMPUTER: ANDREWS | CHECKED BY: | DATE: 4/1/65

TRY 16 WF 96

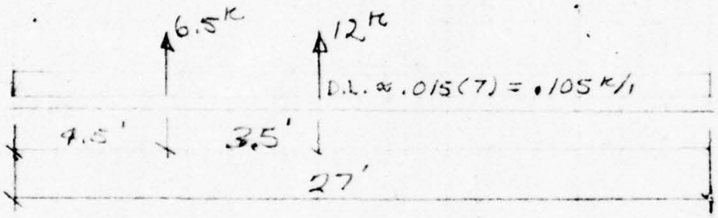
$f = \frac{3130}{166} = 18.9\ \text{ksi}$ $\quad P/A = \frac{150}{28.22} = 5.3\ \text{ksi}$

$18.9 + 5.3 = 24.2\ \text{ksi} \approx 24\ \text{ksi}$

USE 16 WF 96 FOR BEAMS CARRYING MOORING LOADS

NOTE: IF EQUALIZER IS NOT USED MUST CONSIDER UNEQUAL LOADS. (SEE SHEET 6-A)

CONSIDER LOADS FROM "A" FRAME



$V_L = \frac{.105(27)}{2} - \frac{6.5(22.5)}{27} - \frac{12(19)}{27}$

$V_L = 1.42 - 5.42 - 8.45 = -12.43^k$

$V_R = 1.42 - \frac{6.5(4.5)}{27} - \frac{12(8)}{27}$

$V_R = 1.42 - 1.08 - 3.56 = -3.22^k$

$\text{MAX. MOM.} = 3.22(19) - \frac{.105(19)^2}{2}$

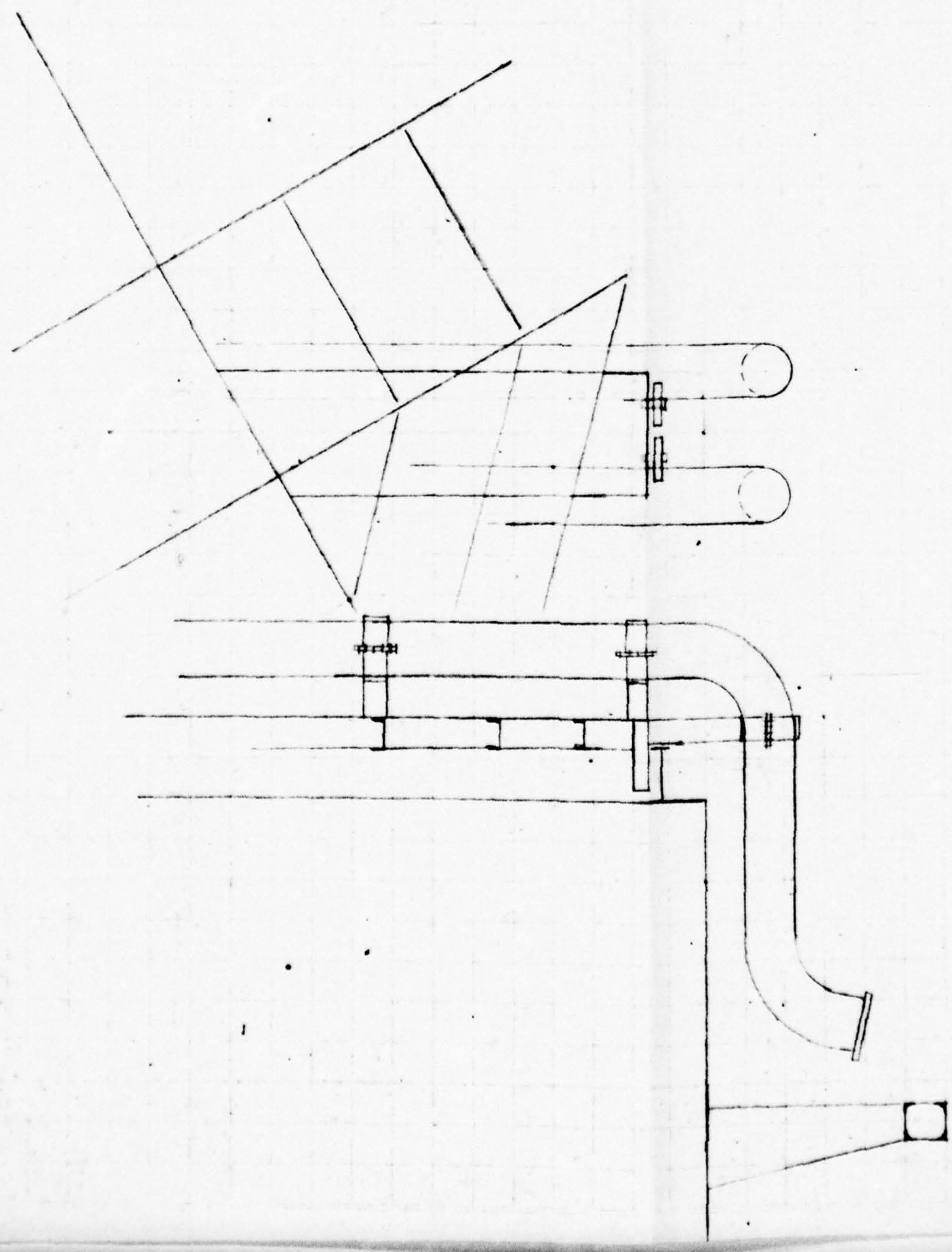
$\text{MAX. MOM.} = 61.2 - 18.9 = 42.3^{\prime k} = 508^{\prime\prime k}$

16 WF 71 O.K. FOR BEAMS SUPPORTING "A" FRAME (BY INSPECTION)

5

LOADS
ERIAL

CONSIDER METHOD OF SUPPORTING PIPE OVER-THE-SIDE.



FRAME

2

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

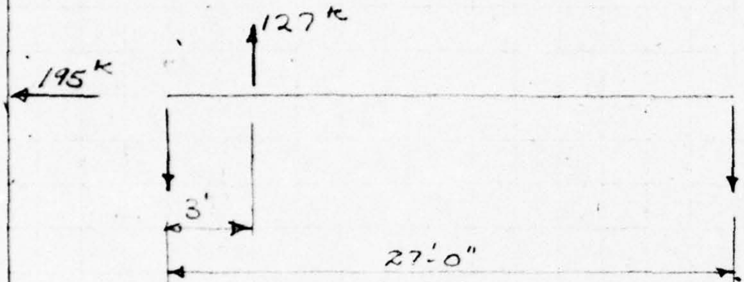
COMPANY	SHEET NO
U.S. ARMY / ERDL	6-A

SUBJECT: MONO - MOORING SYSTEM

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		5/6/65

RE-DESIGN 16 WF 96 FOR ONE PAD-EYE
TO TAKE 65% OF MOORING LOAD

$300(.65) = \underline{195^k}$ $\quad 195(.65) = \underline{127^k}$



$V_L = \frac{24}{27}(127) = \underline{113^k}$

$M = 113(3)(12) = \underline{4{,}060''^k}$

$f_B = \frac{4060}{166} = 24.4 \text{ ksi} \quad P/A = \frac{195}{28.22} = \underline{6.9 \text{ ksi}}$

TRY H.S. STEEL WITH 50 KSI YIELD

$F_a = \underline{30 \text{ ksi}} \quad F_B = \underline{33 \text{ ksi}}$

UNITY CHECK

$\frac{24.4}{33} + \frac{6.9}{30} = \underline{.74 + .23 = 0.97 < 1.0 \text{ O.K.}}$

16 WF 96 O.K. WITH 50 KSI STEEL

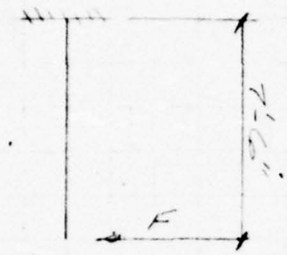
ENGINEERING DEPARTMENT
COMPUTATION SHEET
MED 14003

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / ERDL	SHEET NO: 7
SUBJECT: MONO-MOORING SYSTEM	

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/2/65

DETERMINE ALLOWABLE FORCE ON 16"ϕ PIPE



$M = 7.5\,F(12)$

$f = \frac{M}{S} \qquad f = \frac{7.5F(12)}{S}$

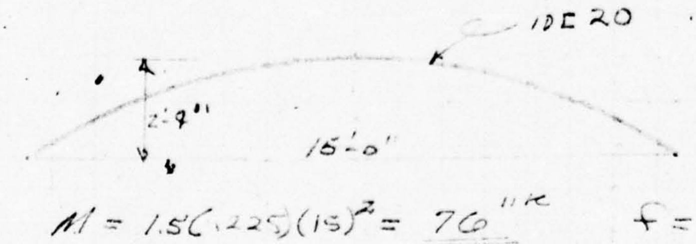
$f_{ALLOWABLE} \approx \underline{20\text{ KSI}}$

FOR 16 ϕ .375 $\quad S = \underline{70.25\text{ IN.}^3}$

$F = \frac{fS}{7.5(12)} = \frac{20(70.25)}{7.5(12)} = \underline{15.6^K}$

USE 16ϕ.375 PIPE SINCE A FORCE LESS THAN 15.6^K WOULD TURN THE DECK AND RELIEVE THE MOMENT.

CHECK OUTSIDE CURVED CHANNEL FOR BENDING AND TORSION.



ASSUME UNIFORM LOAD WITH 1'-6" SPC.

$M = 1.5(.225)(15)^2 = 76^{\text{"K}} \qquad f = \frac{76}{15.7} = \underline{4.84\text{ KSI}}$

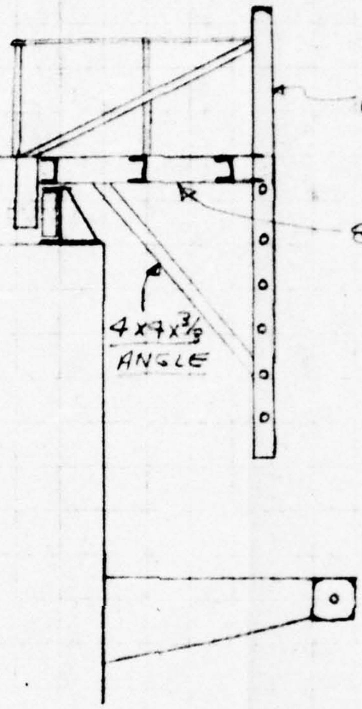
TORSIONAL MOMENT $\approx .225(15)(2.33)(.8)(12) = \underline{75}^{\text{"K}}$

POLAR MOMENT OF INERTIA $= I_x + I_y = 78.5 + 2.8 = \underline{101.3\text{ IN.}^4}$

$S_S = \frac{Tc}{J} = \frac{75(5)}{101.3} = \underline{3.7\text{ KSI}} < \underline{13.5\text{ KSI}}$ O.K.

10⊏20 O.K. FOR OUTSIDE MEMBER

DESIGN OF BOATLANDING



ASSUME MAX. VERTICAL LOAD ON BOATLANDING ≈ 1000#

MAX. MOM. $= 5.5(1)(12) = 66''^{k}$

$f = \frac{66}{35.5} = 1.85 ksi$

HOLD ALL MATERIAL EXCEPT HANDRAILS TO MIN. 3/8" THICK

ENGINEERING DEPARTMENT
COMPUTATION SHEET

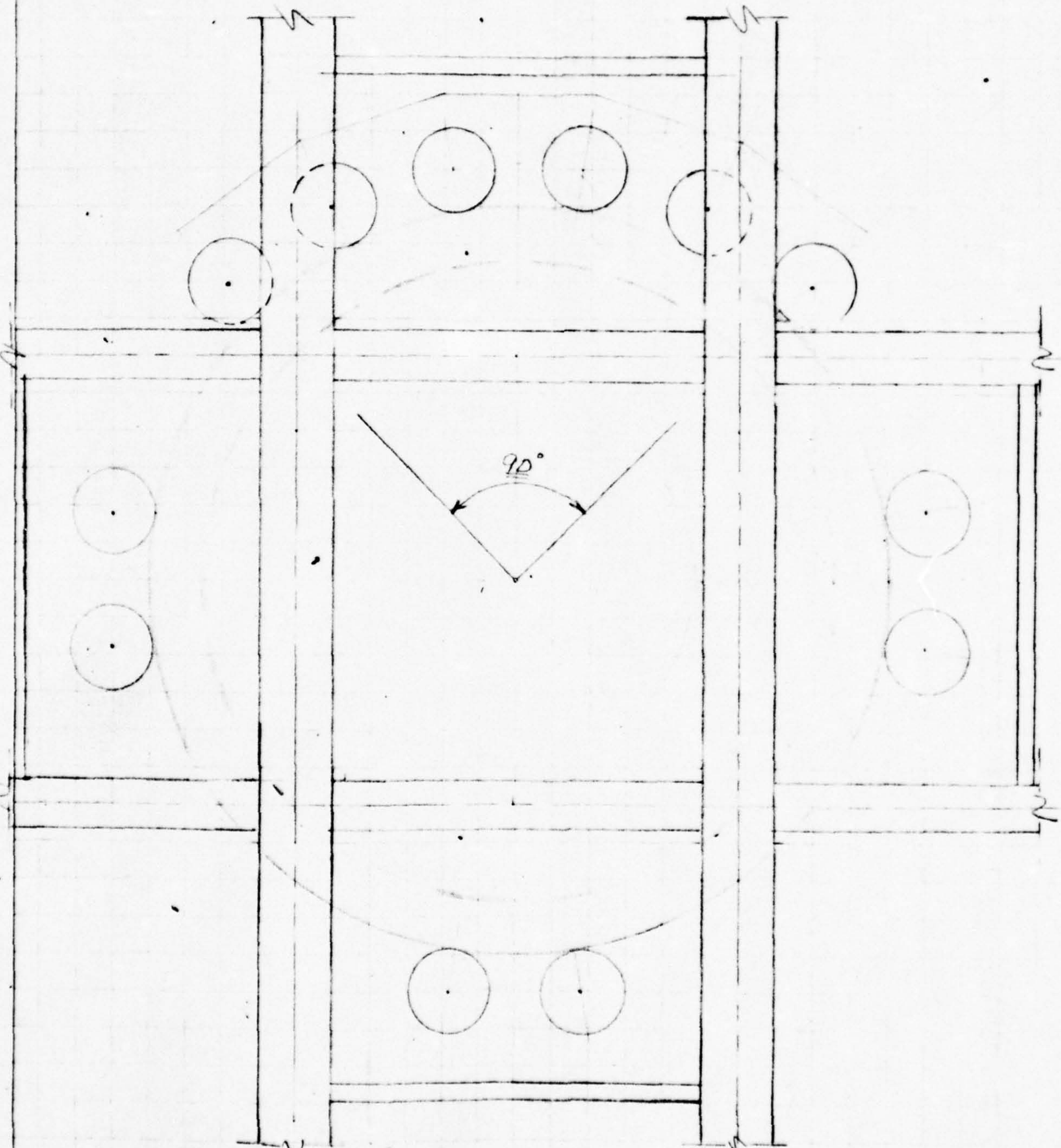
J. RAY McDERMOTT & CO., INC.

MED 14003

COMPANY	SHEET NO.
U.S. ARMY / ERDL	8
SUBJECT: MONO-MOORING SYSTEM	

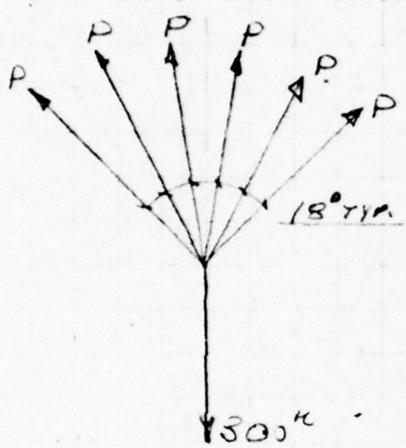
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/2/65

DESIGN OF BOGIE WHEEL SUPPORTS



$$\begin{array}{r}45\\ 18\\ \hline 27\end{array}$$

DETERMINE MAX. FORCE IN WHEELS.
(ASSUME ALL WHEEL CARRY EQUAL LOAD)



$\Sigma H = 0 = 300 - 2P\cos 45° - 2P\cos 27° - 2P\cos 9°$

$\Sigma H = 300 - 2P(.707) - 2P(.891) - 2P(.988)$

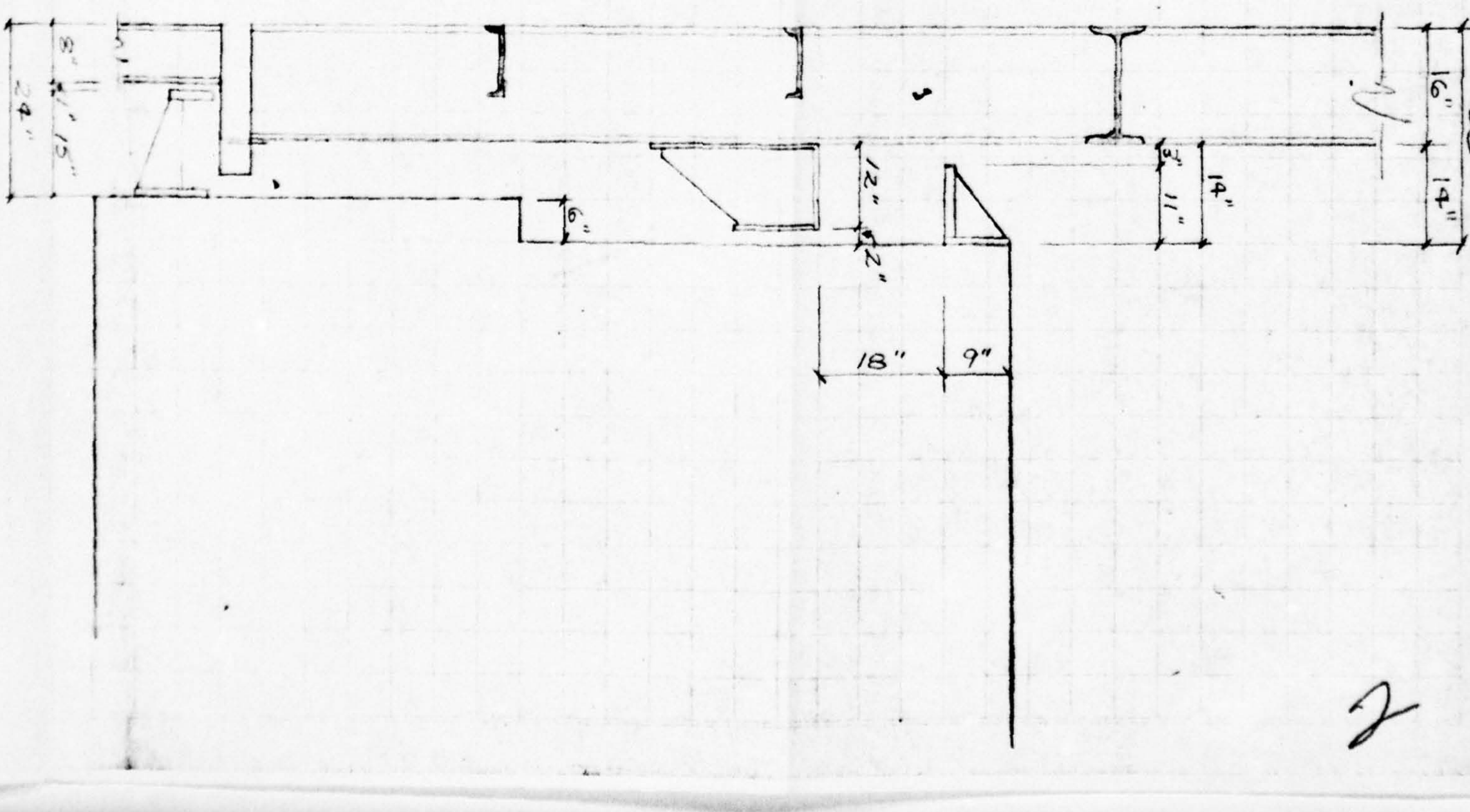
$H = 300 - 1.414P - 1.78P - 1.975P$

$H = 300 - 5.169P$

$P = \frac{300}{5.164}$

$P = \underline{58^K}$

CLEARANCES.



2

ENGINEERING DEPARTMENT
COMPUTATION SHEET

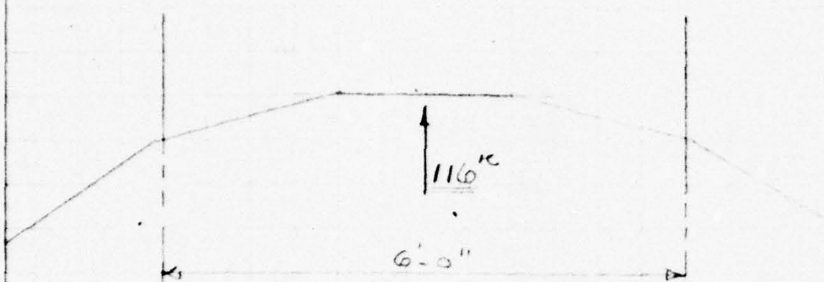
MCD 14003

J. RAY MCDERMOTT & CO., INC.

COMPANY	SHEET NO.
U. S. ARMY / ERDL	9

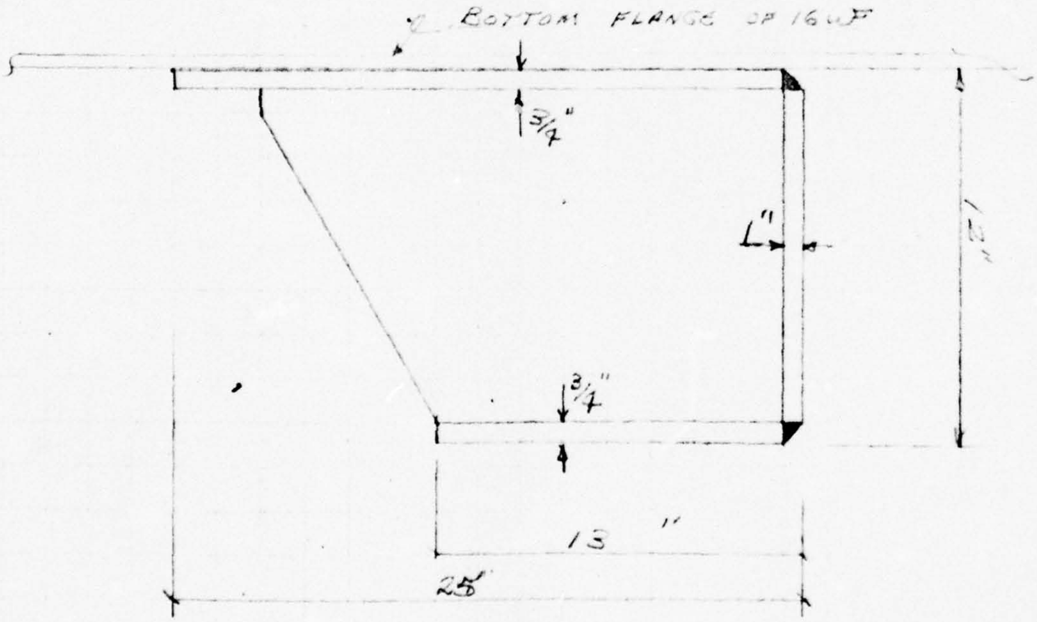
SUBJECT			
MONO-MOORING SYSTEM			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/7/65

DESIGN OF BOGIE WHEEL SUPPORT



27
17
5.97

$M = \frac{PL(12)}{4} = 3(116)(6) = \underline{2090}''^{k}$ SHEAR FOR WELD ≈ $\underline{300}^{k}$



FIND C. OF G.

AREA		LEVER ARM		dA
18	×	13	=	234
9	×	7	=	63
10.5	×	.5	=	5.25
37.5				302.25

$\bar{x} = \frac{302.25}{37.5} = \underline{8.06}''$

DETERMINING M

$I = \left(\frac{.75(8.06)^3}{3}\right) 2$

$= \frac{.75(15.92)^3}{3}$

$= \frac{.75(3.17)^3}{3}$

$= 10.5(7.55)^2$

$f_c = \frac{Mc}{I} = \frac{2090}{181}$

$f_t = \frac{Mc}{I} = 209$

TORQUE = 11

TORQUE O.K.

CHECK WEL

TOTAL F =

TRY 7/8 FIL

I =

FORCE/ =

FORCE/ =

F/ ALLOWAB

$.75(.707)(13.5) =$

ERNING MOMENT OF INERTIA

$\frac{.75(8.06)^3}{3}(2) = 262.0$

$\frac{.75(15.92)^3}{3} = 1015.0$

$\frac{.75(3.19)^3}{3} = 15.6$

$0.5(7.55)^2 = 604.0$

$I = 1,896.6 \text{ IN.}^4$

$\frac{Mc}{I} = \frac{2090(8.06)}{1896.6} = 8.8 \text{ KSI}$

$\frac{Mc}{I} = \frac{2090(15.9)}{1896.6} = 17.5 \text{ KSI}$

OIE $= 116(6) = 696''^{k}$

OUS O.K. BY INSPECTION

CK LENGTH OF WELD REQ'D

AL $P = 300^k$ $L = 24(4) = 96''$

$\frac{7}{8}$ FILLET WELD

300^k $M = 300(6) = 1800''^k$

$I = \frac{(24)^3}{12}(4) = 4,600 \text{ IN.}^4$

ORCE/I $= \frac{P}{A} + \frac{Mc}{I} = \frac{300}{96} + \frac{1800(12)}{4,600}$

E/I $= 3.12 + 4.7 = 7.82^k/_{"}$

ALLOWABLE $= .875(.707)(14.5) = 8.96^k/_{"} \rightarrow$ A-36

$(13.0) = 8.04^k/_{"} \rightarrow$ A-7

USE $\frac{7}{8}$" FILLET WELD TO BOTTOM FLANGE OF 16WF96

CHECK APPROXIMATE DEF'L. OF SUPPORT:

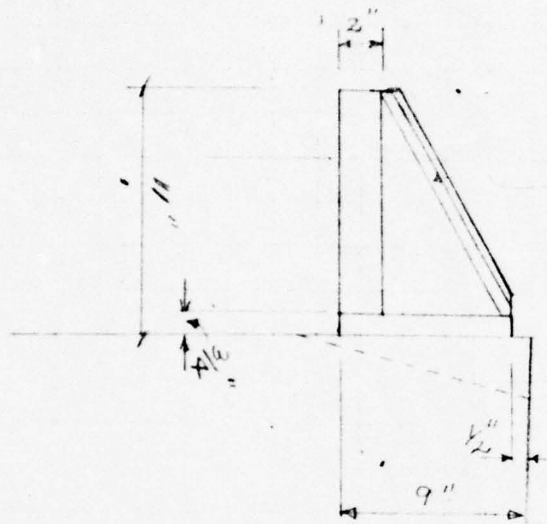
$\Delta = \frac{PL^3}{3EI} = \frac{116(6)^3}{87(1896)} = .0159"$ O.K.

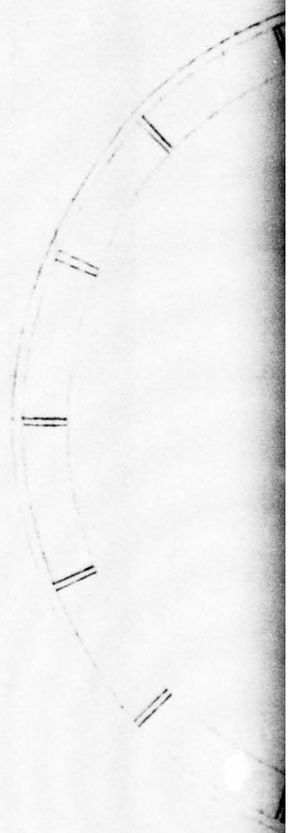
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY / ERDL	SHEET NO: 10
SUBJECT: MONO-MOORING SYSTEM	
DRAWING NUMBER: JOB 56017	COMPUTER: ANDREWS
CHECKED BY:	DATE: 4/7/65

DESIGN OF INTER-RACE





CHECK CASE 50 PG. 206 OF "FORMULAS FOR STRESS & STRAIN" BY ROARK.

MAX. CONC LOAD = $\underline{58^k}$

APPROXIMATE EQUIVALENT UNIFORM LOAD

$\frac{58(2)}{21(10.25)} = \underline{530 psi}$

MAX. $S = \beta \frac{w a^2}{t^2}$ $\quad a/b = \frac{21}{10.25} = 2.04 \quad \beta = \underline{0.35}$

$S = \frac{.35(530)(21)^2}{(2)^2} = \underline{20,500 psi}$ O.K.

CHECK DEFLECTION $\quad \alpha \approx .075$

$y = \frac{w a^4}{E t^3}\alpha = \frac{.530(21)^4}{30,000(2)^3}(.075) = \underline{.0522''}$

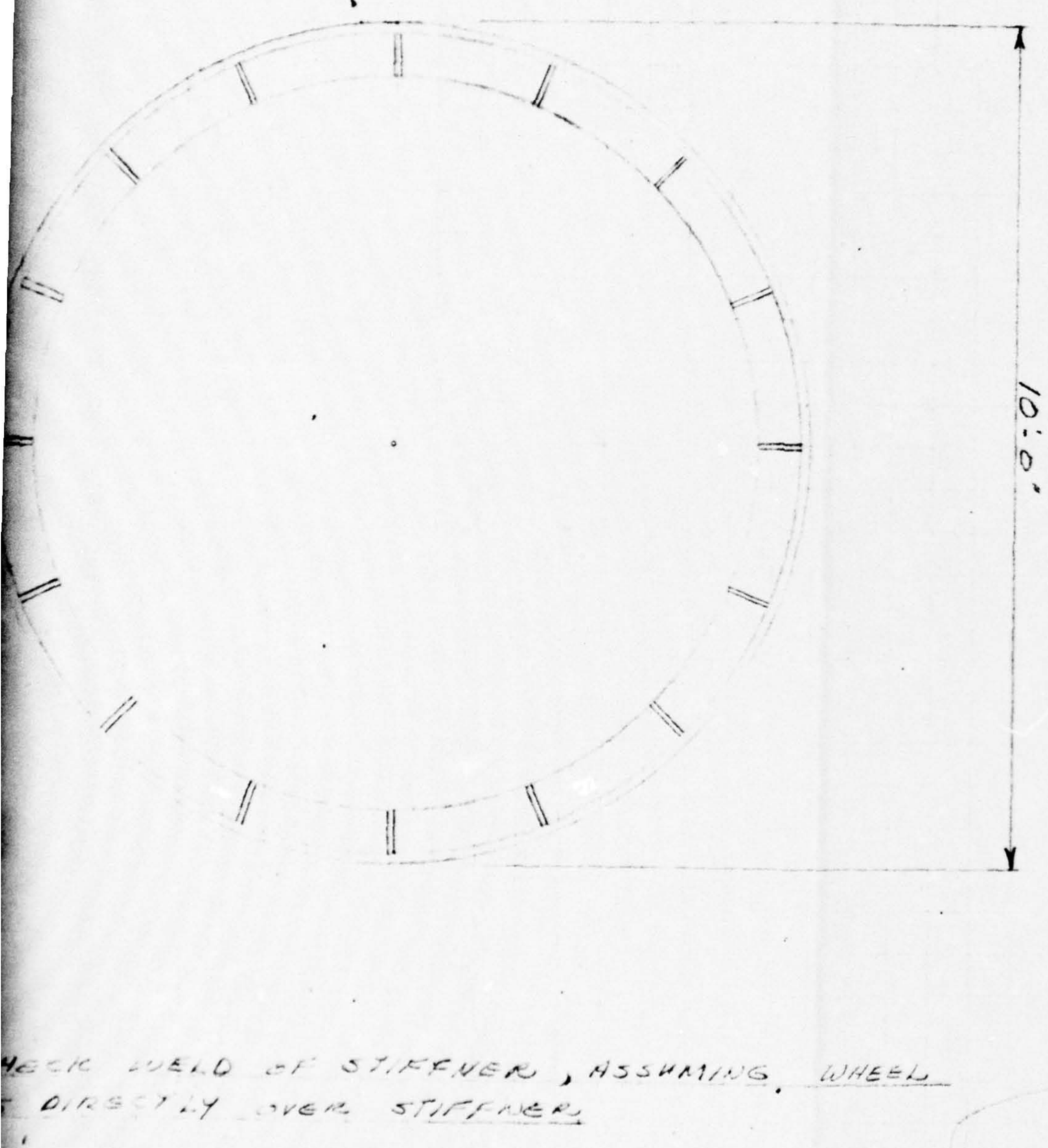
USE 2" ℄ H.S. STEEL

CHECK WELD
IS DIRECTLY

MAX. P = 58

F/11 = 58/13 = 4.46

M = 58(2) = 4.6



HECK WELD OF STIFFENER, ASSUMING WHEEL
DIRECTLY OVER STIFFENER

Y. $P = \underline{58^{K}}$ LENGTH OF WELD $= 6.5(2) = \underline{13''}$

$= \frac{58}{13} = \underline{4.46\ ^{K}/_{11}}$ $I = \frac{(13)^3}{12}(2) = \underline{370\ IN.^3}$

$= 58(8) = 469''^{K}$ $f = \frac{Mc}{I} = \frac{469(3.25)}{370} = 4.08^{K}/_{11}$ TOTAL $F/_{11} = 8.54^{K}/_{11}$

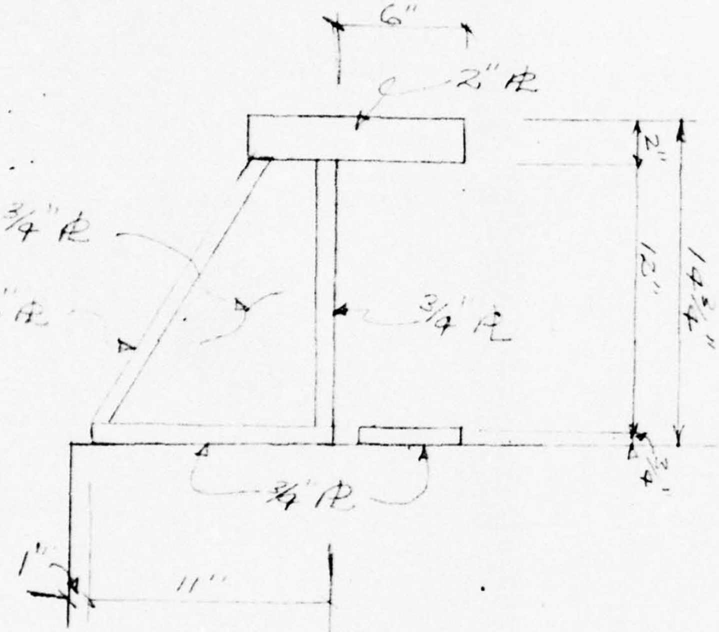
TRY $\frac{3}{4}''$ FILLET $.5(.707)(20) = \underline{10.6\ ^{K}/_{11}}$ O.K.

* NOTE: USE HIGH STRENGTH STEEL & WELDING ROD FOR RACE.

7

DESIGN OF OUTER-RACE

MAX. LOAD/1 $\approx \frac{195}{6} = \underline{32.5^k}$



MAX. MOM. = 32.5(4) = 130.0"k

ASSUME WIDTH OF SECTION = 6t & LOADED AS A CANTILEVERED BEAM. TRY t = 2"

$S = \frac{bd^2}{6} = \frac{12(2)^2}{6} = \underline{8\ IN.^3}$ $f = \frac{130}{8} = \underline{16.3\ ksi}$

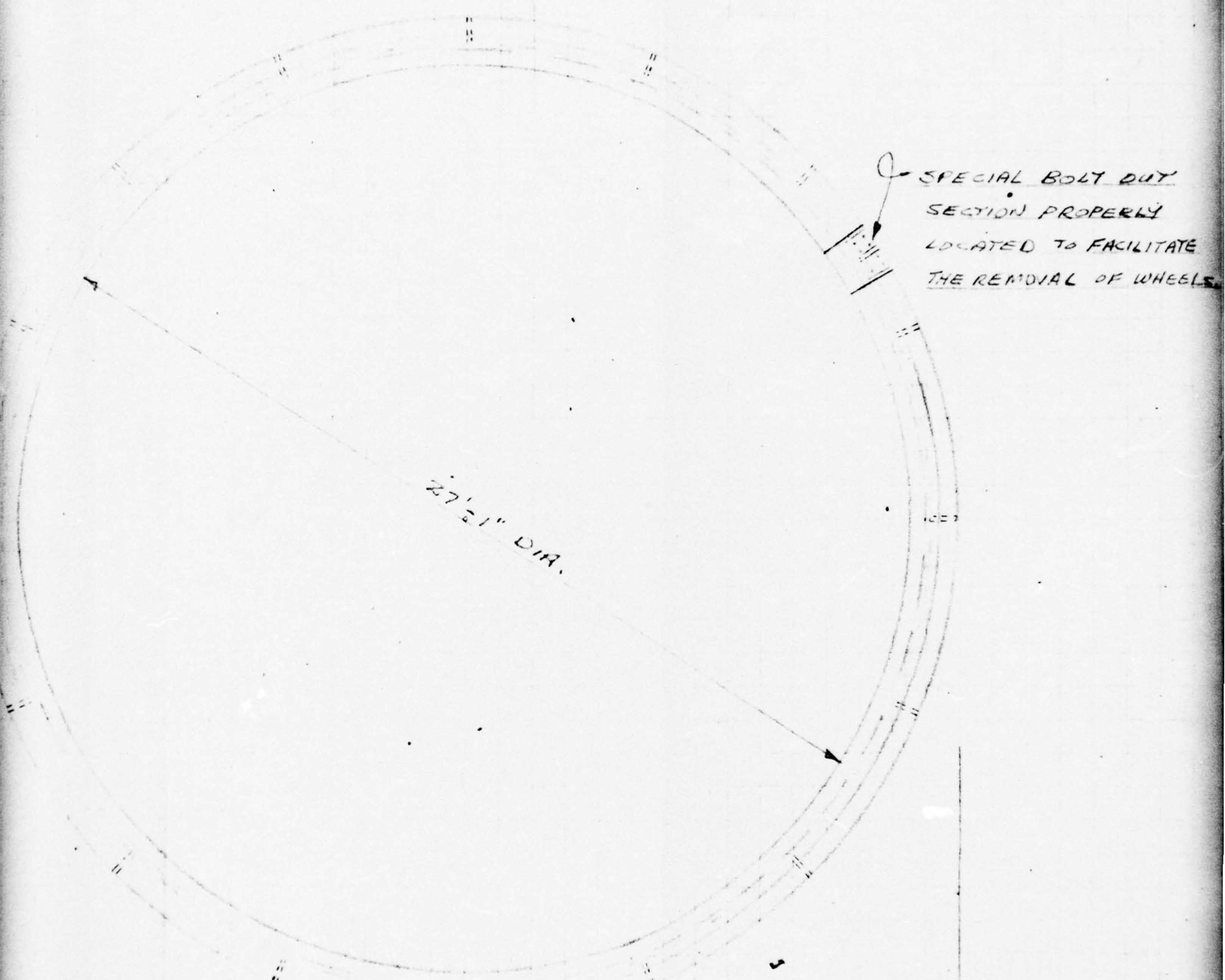
CHECK CASE 63 PG. 211 IN ROARK

$a/b = \frac{169}{162} = 1.04$ USE $\beta = 3.2$

MAX. $S = \frac{\beta w}{t^2} = \frac{3.2(32.5)}{(2)^2} = \underline{26\ ksi}$

USE 2" ℞ H.S. STEEL

= 5.89'


SPECIAL BOLT OUT SECTION PROPERLY LOCATED TO FACILITATE THE REMOVAL OF WHEELS.
27'-1" DIA.
29'-10" DIA.

2

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY / ERDL	12
SUBJECT: MONO - MOORING SYSTEM	

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/5/65

DESIGN OF BOLT DOWN CONN.

ASSUME WHEEL IN MIDDLE OF SECTION

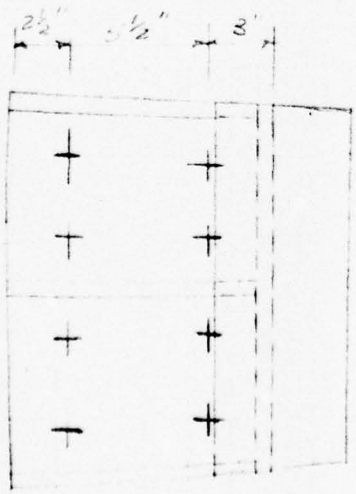
$$M = 0 = 32.5(11.25) - P(4.25)$$

$$P = \frac{32.5(11.25)}{4.25} = \underline{86}^{k}$$

USE H.S. BOLTS A325

$$\text{No. REQ'D.} = \frac{86}{31.42} = 2.7$$

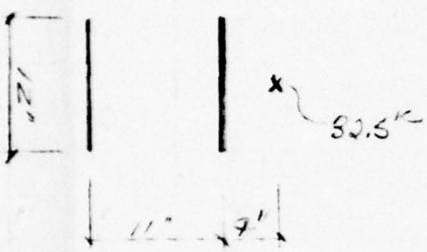
USE 8 - 1"ϕ - A325 BOLTS.



65

ASSUME WHEEL SPACED APPROXIMATELY 18" O.C.

CHECK WELD FOR 1' WIDE SECTION



$M = 32.5(9.5) = \underline{308''^{K}}$

$I = Ad^2 = 24(5.5)^2 = \underline{726 \text{ in.}^4}$

$P/A = \frac{32.5}{24} = \underline{1.35\ ^{K}/_{"}}$ $\qquad$ $\frac{M}{I} = \frac{308(5.5)}{726} = \underline{2.34\ ^{K}/_{"}}$

$1.35 + 2.34 = \underline{3.69\ ^{K}/_{"}}$

TRY $\frac{1}{2}$" FILLET WELD

ALLOWABLE $F\ ^{K}/_{"} = .5(.707)(13) = \underline{4.6\ ^{K}/_{"}} > 3.69$ O.K.

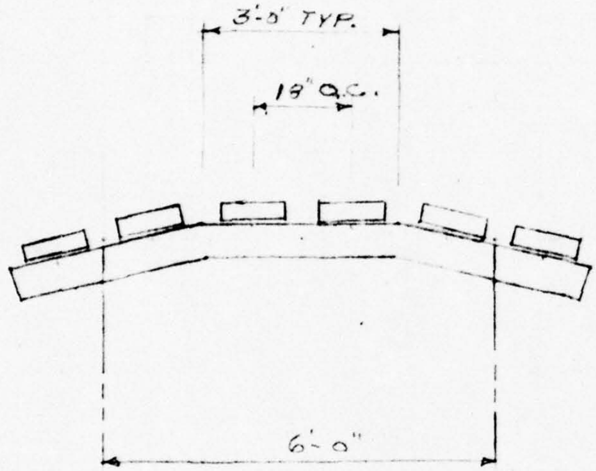
J

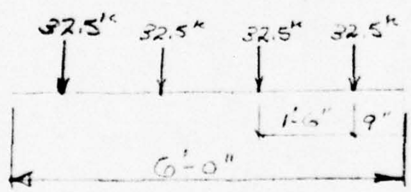
ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY MCDERMOTT & CO., INC.

COMPANY: U.S. ARMY/ERDL
SHEET NO: 13
SUBJECT: MONO-MOORING SYSTEM
DRAWING NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 4/ /65

DESIGN OF SUPPORTS FOR OUTER BOGIE WHEELS.

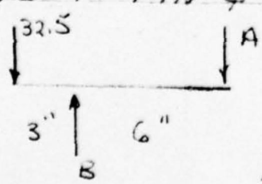




1.46
48.8
97.2

MAX. $M = 65(2.25) - 32.5(1.5) = 97.2^{\prime k} = \underline{1165}^{\prime\prime k}$

CHECK PIN & SIDE PLATES



$A = \frac{32.5(3)}{6} = \underline{16.3^k}$ $B = \frac{32.5(9)}{6} = \underline{48.8^k}$

$M = 32.5(3) = \underline{97.5^{\prime\prime k}}$ USE $3\frac{1}{4}$" φ PIN

℞ THICKNESS REQ'D $= \frac{48.8}{109} = 0.47$" USE $3/4$" ℞

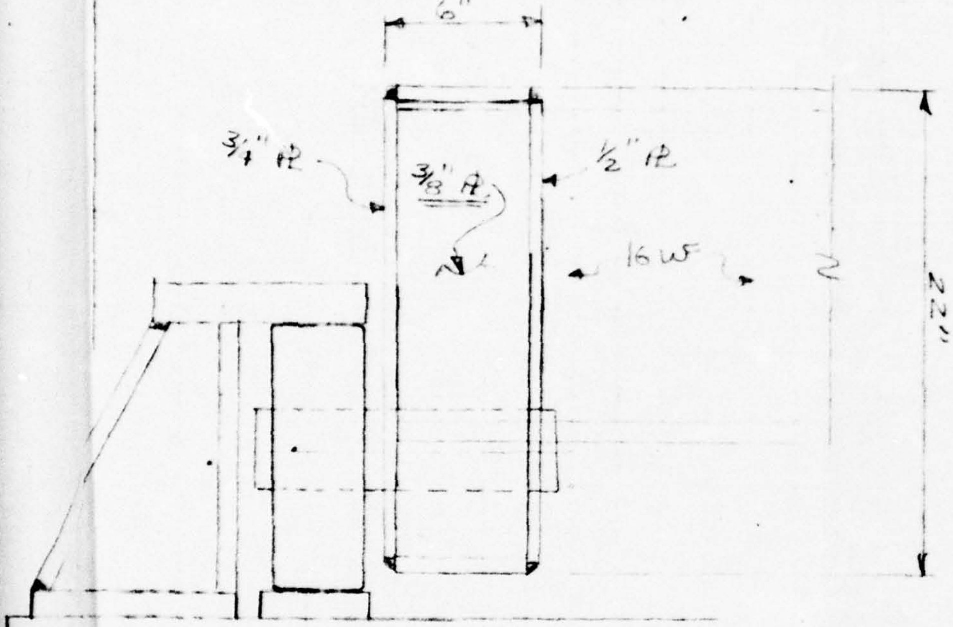
$$\begin{array}{r} 584 \\ 975 \\ \hline 1559 \end{array} \qquad \begin{array}{r} 1550 \\ 208 \\ \hline 1758 \end{array} \qquad 4.75$$

CONSIDER BENDING ON SUPPORT

MAX MOM. = 1165 "K

MAX. TORQUE $\approx 65(9) + 65(7.5)(2)$

$T = 1559$ "K



DETERMINE MOMENT OF INERTIA

$$I_{xx} = \frac{6.0(22)^3}{12} = 5230$$

$$- \frac{4.75(21)^3}{12} = -3680$$

$$I_{x-x} = 1550 \text{ IN}^4$$

$$I_{yy} = \frac{22(6.0)^3}{12} = 396$$

$$- \frac{21(4.75)^3}{12} = 188$$

$$I_{y\text{-}y} = 208 \text{ IN}^4$$

DETERMINE POLAR MOMENT OF INERTIA.

$$J = I_{xx} + I_{yy} = 1758 \text{ IN}^4$$

$$f = \frac{Mc}{I} = \frac{1165(11)}{1550} = 8.26 \text{ ksi}$$

$$T_s = \frac{Tc}{J} = \frac{1559(11.5)}{1758} = 10.2 \text{ ksi}$$

$$R_s = \sqrt{(4.13)^2 + (10.2)^2} = 11.06 \text{ ksi}$$

$$\text{MAX } S = \frac{f}{2} + R_s = 4.13 + 11.06 = 15.19 \text{ ksi O.K.}$$

PENDANT SUPPORTS

SWIVEL TO BUOY CONNECTION

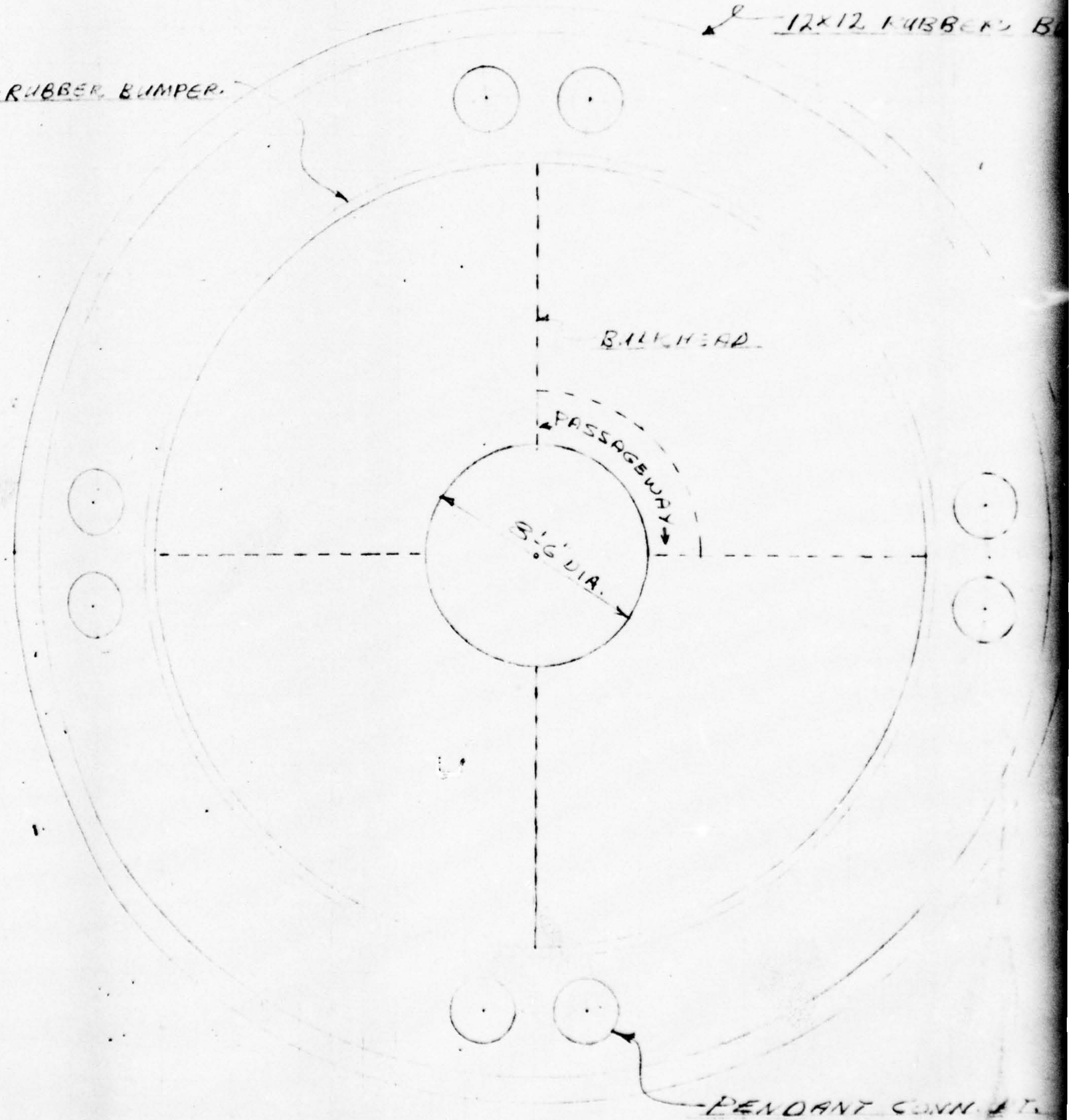
TEMPORARY MOORING POINT

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

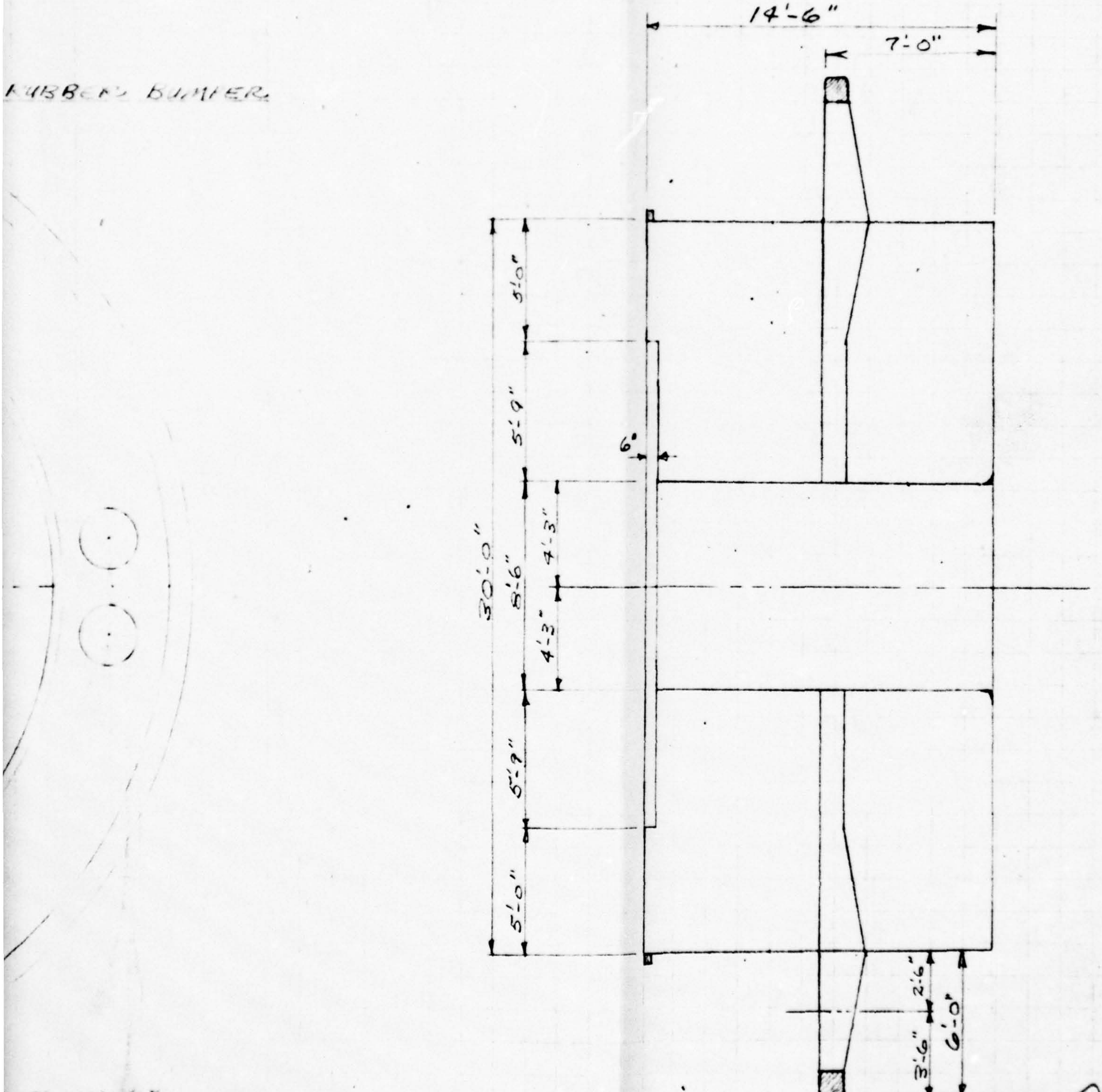
J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
U. S. ARMY / EROL			1
SUBJECT: MONO-MOORING SYSTEM (PENDANT SUPPORTS)			
DRAWING NUMBER: JOB 56017	COMPUTER: ANDREWS	CHECKED BY:	DATE: 4/9/65

DESIGN OF PENDANT SUPPORTS



PENDANT SUPPORTS



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2

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

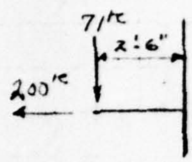
COMPANY	SHEET NO
U.S. ARMY / ERDL	2

SUBJECT: MONO-MOORING SYSTEM

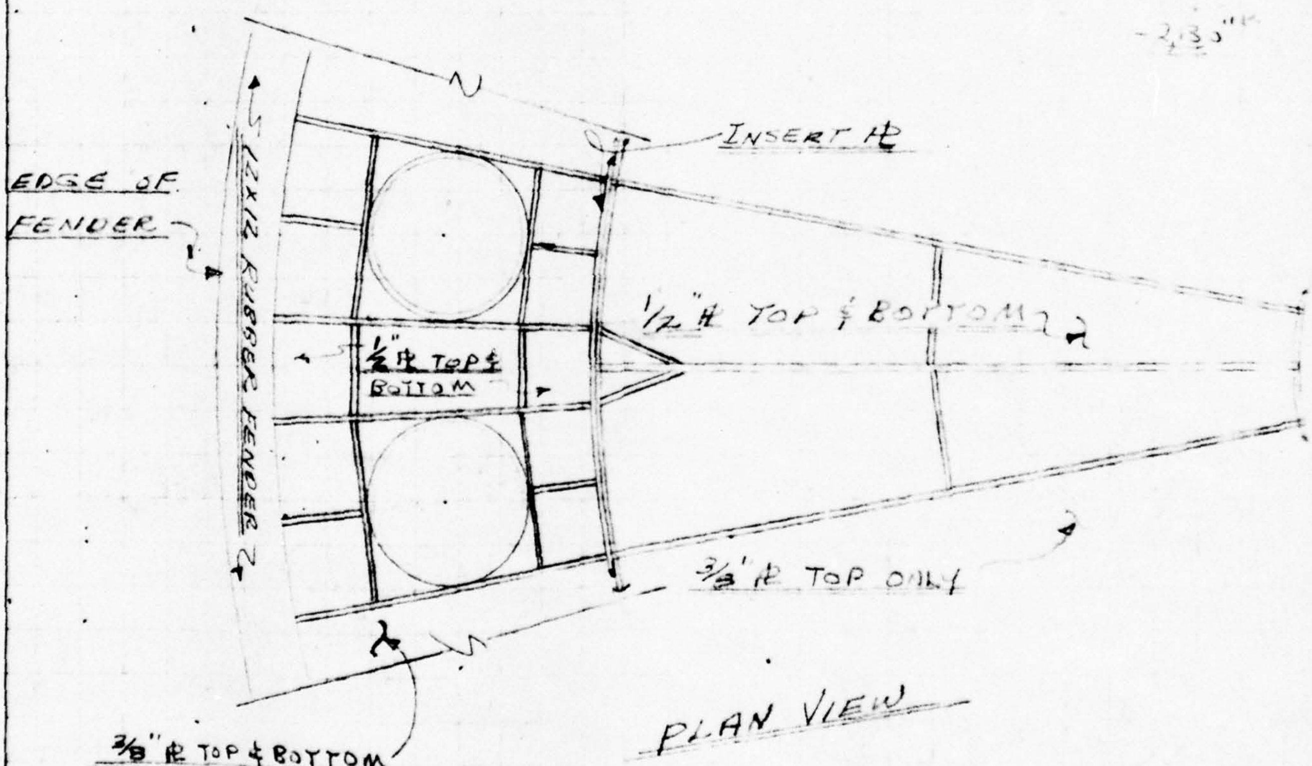
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB. 56017	ANDREWS		4/12/65

MAX. HORIZONTAL @ PENDANT ≈ 240^k $V = 42^k$

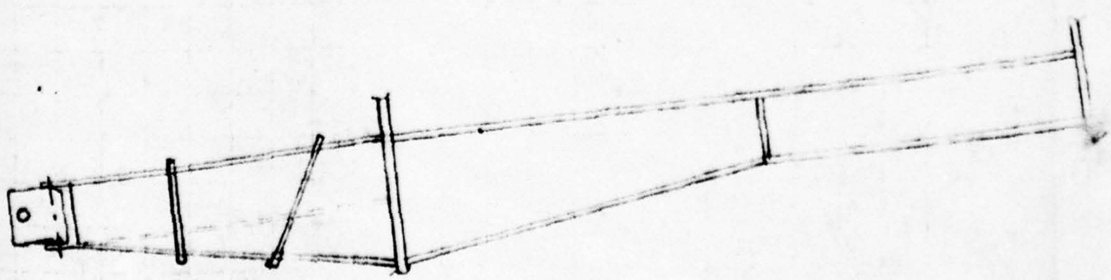
HORIZONTAL REACTION @ 168' VPCC ≈ 200^k $V = 71^k$



$M = 71(30) = 2,130'^k$

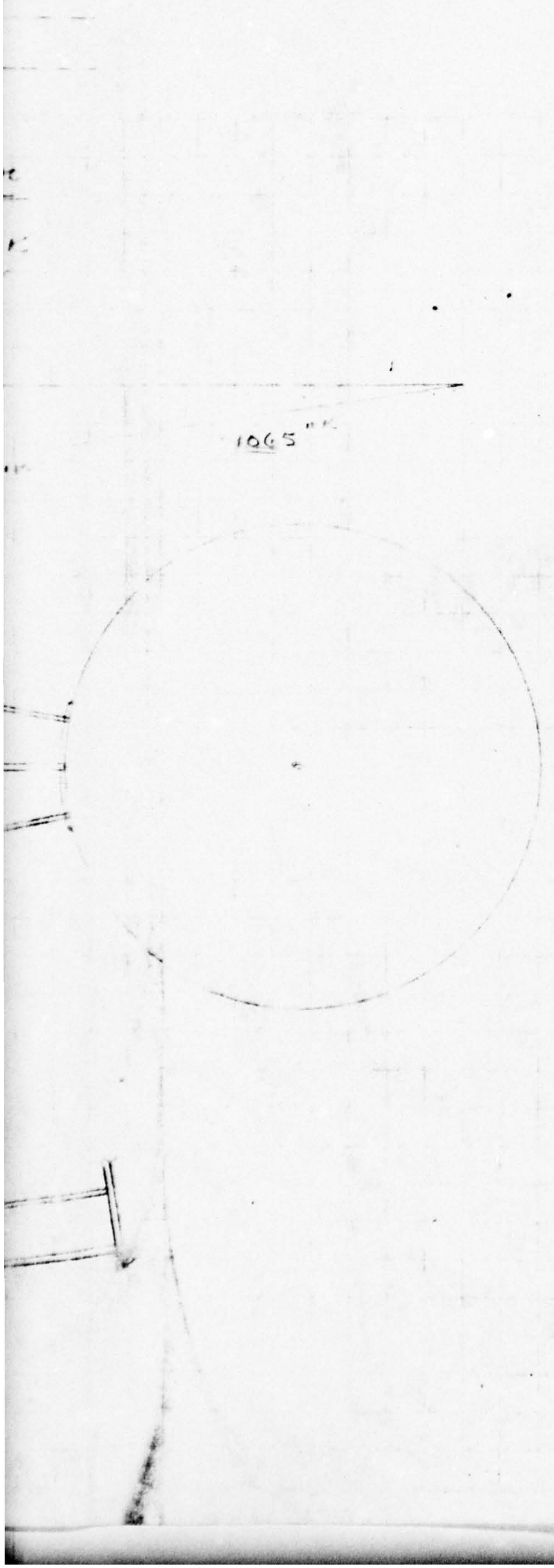


PLAN VIEW



SECTION

1950



DETERMINE SECTION MODULUS OF 24 × 33 × 3/8 PL BOX BEAM

$I = \frac{bd^3}{12} = \frac{33(24)^3}{12} = 38,200$

$- \frac{bd^3}{12} = \frac{32.25(23.25)^3}{12} = \underline{34100}$

$A = 33(24) = 792 \qquad I = 4,100 \text{ in.}^4$

$32.25(23.25) = 750$

$A = \underline{42^{\square''}} \qquad S = \frac{4100}{12} = \underline{342 \text{ in.}^3}$

SECTION MODULUS OF 12 × 21 × 3/8" PL. BM.

$I = \frac{bd^3}{12} = \frac{21(12)^3}{12} = 3030$

$= \frac{bd^3}{12} = \frac{20.25(11.25)^3}{12} = \underline{2420}$

$A = 21(12) = 252 \qquad I = \underline{610 \text{ in.}^4}$

$20.25(11.25) = 228$

$A = \underline{24^{\square''}} \qquad S = \frac{610}{6} = \underline{101.5 \text{ in.}^3}$

CHECK 12" DEEP SECTION

$f = \frac{M}{S} = \frac{1065}{101.5} = \underline{10.5 \text{ ksi}}$

$P/A = \frac{200}{24} = \qquad 8.3 \text{ ksi}$

$\underline{18.8 \text{ ksi}}$

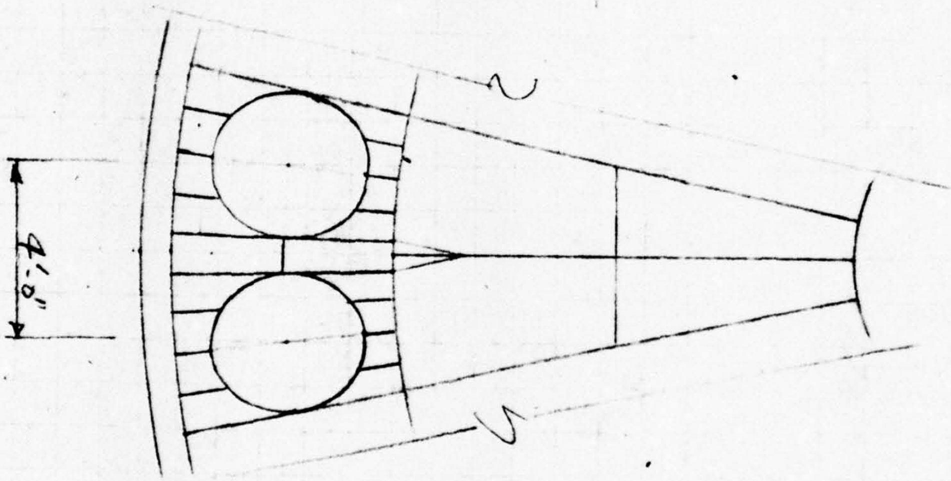
NOTE: CHANGE THICK OF TOP & BOTTOM PL ON BEAM TO 1/2" TO ALLOW FOR CORROSION

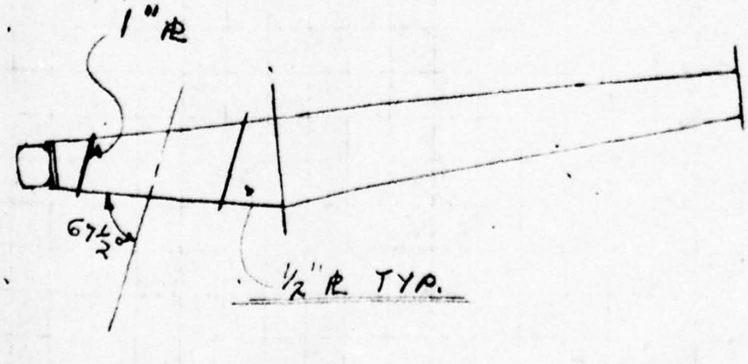
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY/ERDL
SHEET NO: 2-A
SUBJECT: MONO-MOORING SYSTEM
DRAWING NUMBER: JOB 56017
COMPUTER: ANDREWS
CHECKED BY:
DATE: 5/6/65

REVISE PENDANT TO BUOY CONN.





ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

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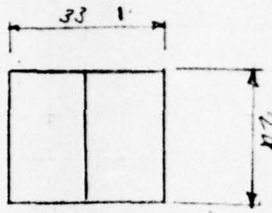
J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U. S. ARMY / ERDL	3
SUBJECT	
MONO-MOORING SYSTEM	

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/10/65

CHECK WELD @ OUTSIDE BUOY EDGE

SHEAR = 71^k TENSION = 200^k $M = 2{,}130''^k$



TOTAL $L = 138''$

$$P/L = \frac{71+200}{138} = 1.96^k/''$$

$$I = \left[\frac{33(24)^3}{12} - \frac{31(22)^3}{12}\right] + \frac{(22)^3}{12}$$

$$I = 38{,}200 - 27{,}600 + 890$$

$$I = 11{,}490 \text{ in}^4$$

$$\frac{Mc}{I} = \frac{2{,}130(12)}{11490} = 2.24^k/''$$

TOTAL FORCE/'' $= 2.24 + 1.96 = 4.20^k/''$

TRY $\frac{1}{2}''$ FILLET WELDS

FORCE/'' ALLOWABLE $= .5(.707)(13.5) = 4.86^k/'' > 4.20$

$\frac{1}{2}''$ FILLET WELD O.K.

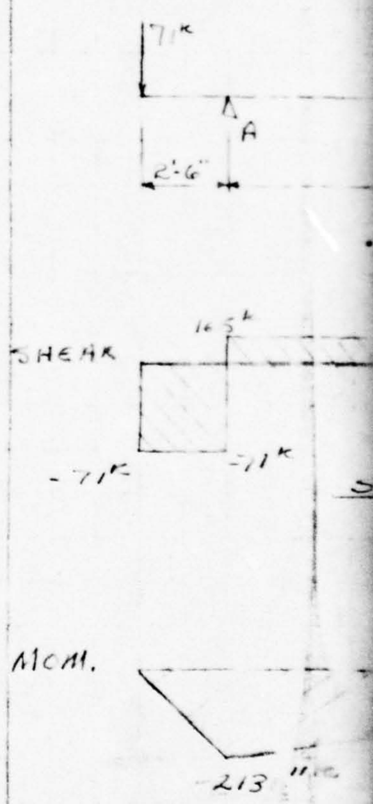
NOTE: VOID ABOVE & MAKE TOP & BOTTOM PLs CONTINUOUS. USE INSERT PL TO TRANSFER SHEAR INTO BUOY HULL.

CHECK VERTICA

$V = 71^k$ $\frac{h}{t} = \frac{24}{.37}$

ALLOW V = 13.1(.3

DETERMINE S

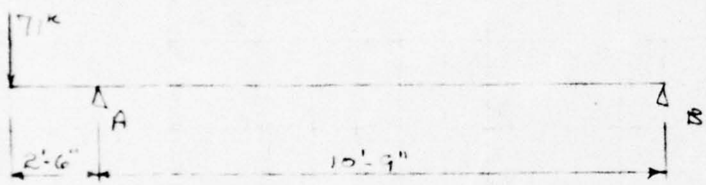


CHECK VERTICAL SHEAR IN WEBS

$V = \underline{71^k}$ $\quad \frac{h}{t} = \frac{24}{.375} = \underline{64}$ $\quad$ ALLOW $v = \underline{13.1\,ksi}$

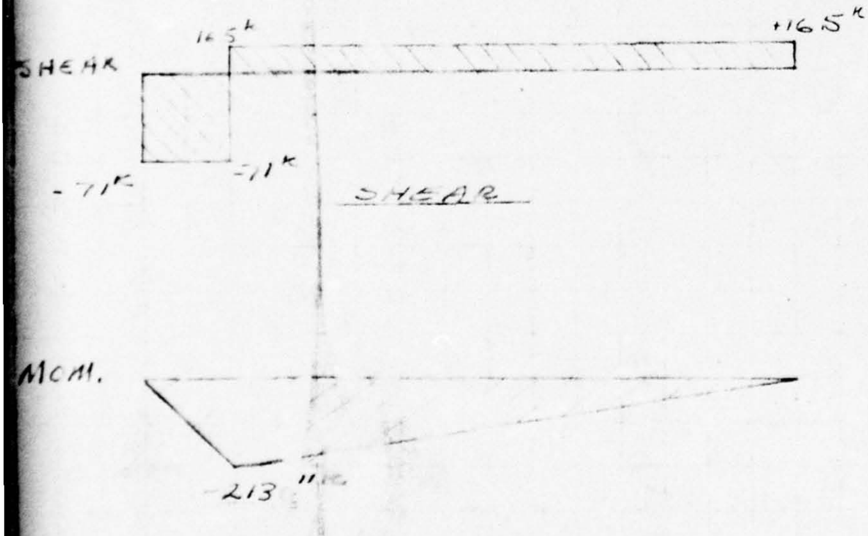
ALLOW $V = 13.1(.375)(24)(1.5) = \underline{172^k > 71^k}$ O.K.

DETERMINE SHEAR & MOMENT DIAGRAM FOR BEAM



$V_A = \frac{71(13.25)}{10.75} = \underline{87.5^k}$

$V_B = \frac{71(2.5)}{10.75} = \underline{16.5^k}$

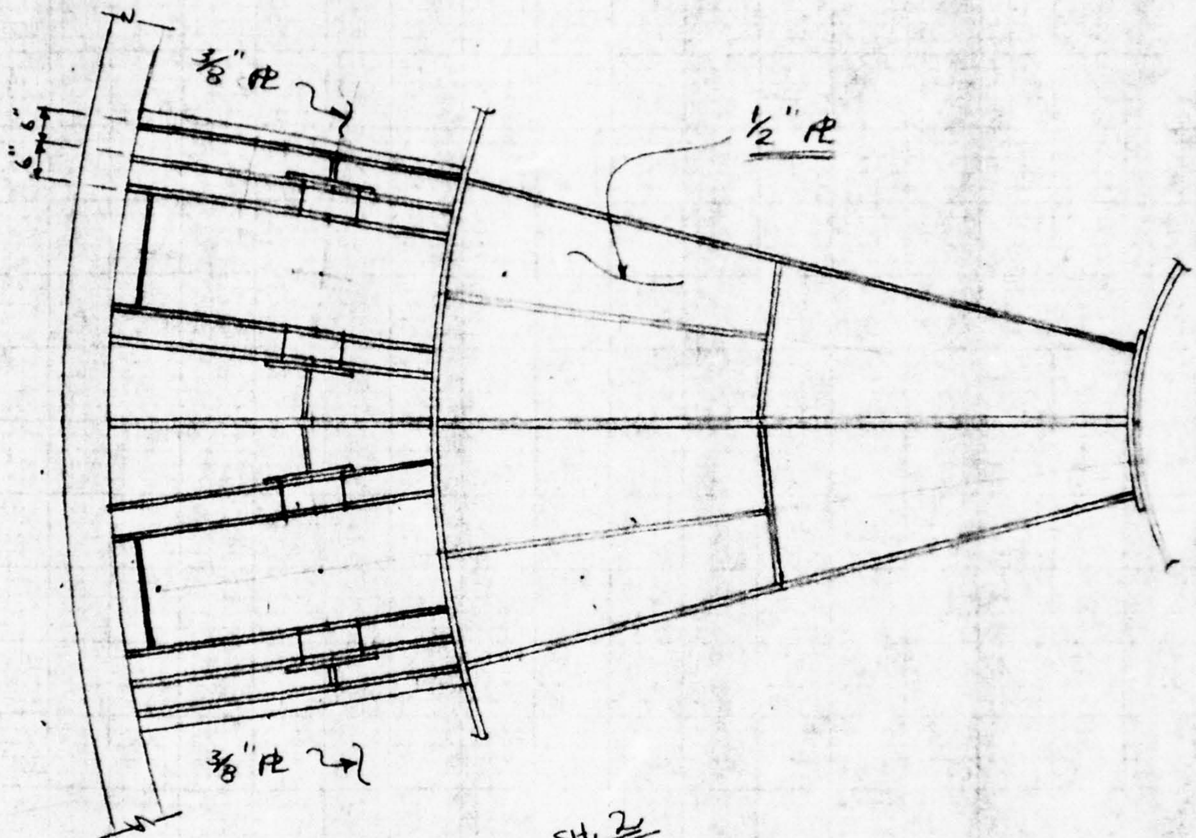


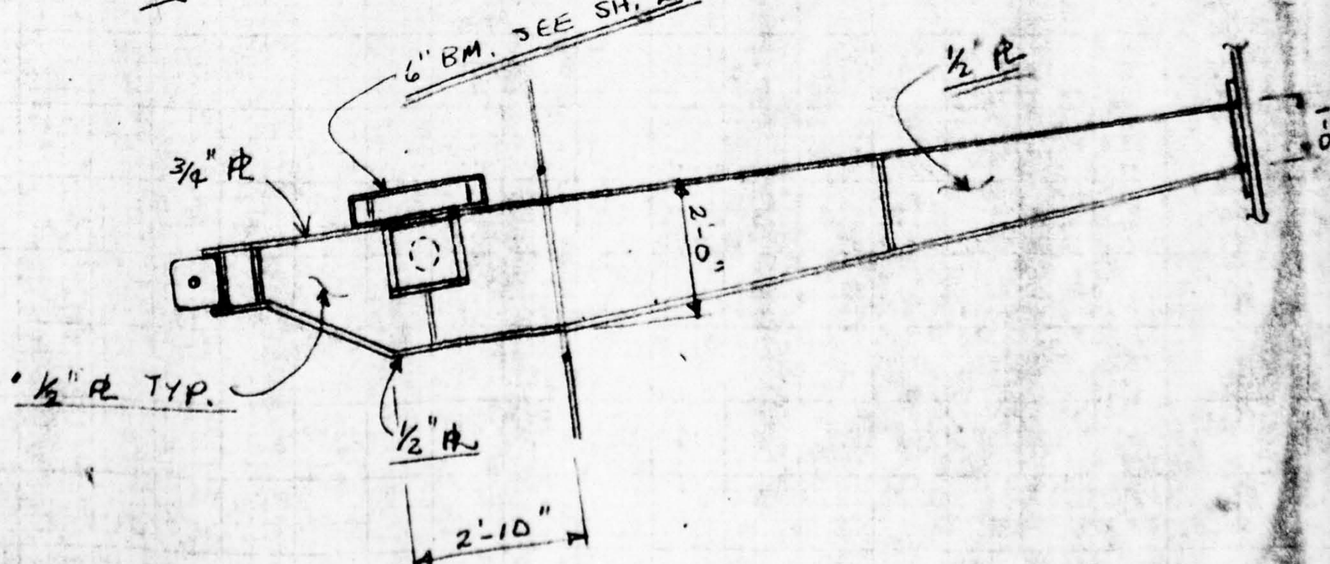
MOMENT

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 9036

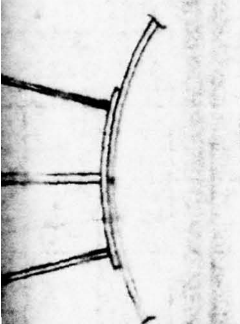
J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
U.S. ARMY / ERDL			1
SUBJECT			
MONO - MOORING SYSTEM			
NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		5/19/65





PENDANT CONNECTIONS



CHECK BEAM

MAX. $V = 72^k = \underline{36^k/\text{SIDE}}$

MAX. $H = 240^k = \underline{120^k/\text{SIDE}}$

MAX. MOM. $= 36(24) = \underline{865''^k}$

$I = \frac{bd^3}{12} = \frac{.5(23)^3}{12} = 507 \text{ IN}^4$

$AD^2 = .5(24)(11.5)^2 = \underline{1590 \text{ IN}^4}$

$I = \underline{2097 \text{ IN}^4}$

$S = \frac{2097}{12} = \underline{171 \text{ IN}^3}$

$P/A = \frac{120}{24(.5)} = \underline{10 \text{ KSi}}$

$f = \frac{865}{171} = 5.1 \text{ KSi}$

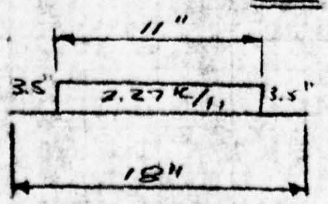
$\underline{15.1 \text{ KSi}}$ O.K.

USE ½" PL.

CHECK COVER PL

MAX. VERTICAL PULL $\approx \underline{50^k} \approx \frac{50}{2(11)} = \underline{2.27^k/''}$

MAX. SPAN $\approx \underline{18''}$



$V_L = V_R = \frac{2.27(11)}{2} = \underline{12.5^k}$

$M = 12.5(9) - \frac{2.27(5.5)^2}{2}$

$M = 112.5 - 34.4$

$M = \underline{78.1}''^k$

$S = \frac{bd^2}{6} = \frac{6(1)^2}{6} = \underline{1 \text{ IN}^3}$

$S \text{ REQ'D} \approx \frac{78.1}{15} = \underline{5.2 \text{ IN}^3}$

112.5
34.4
78.1

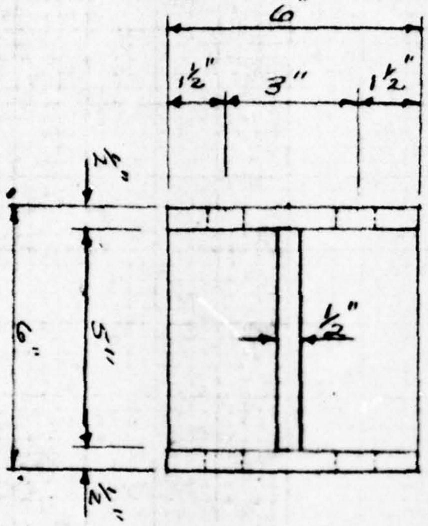
7

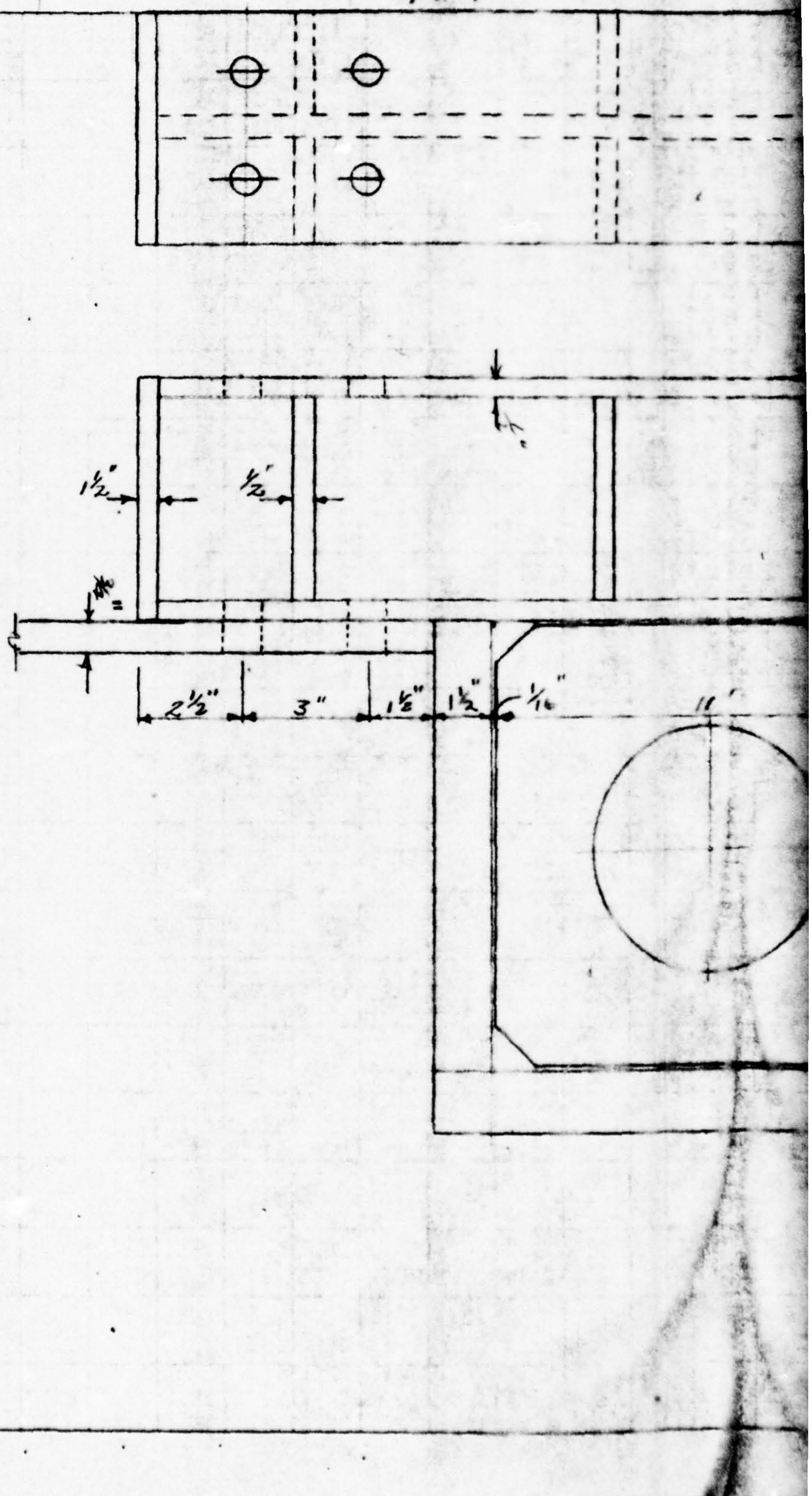
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

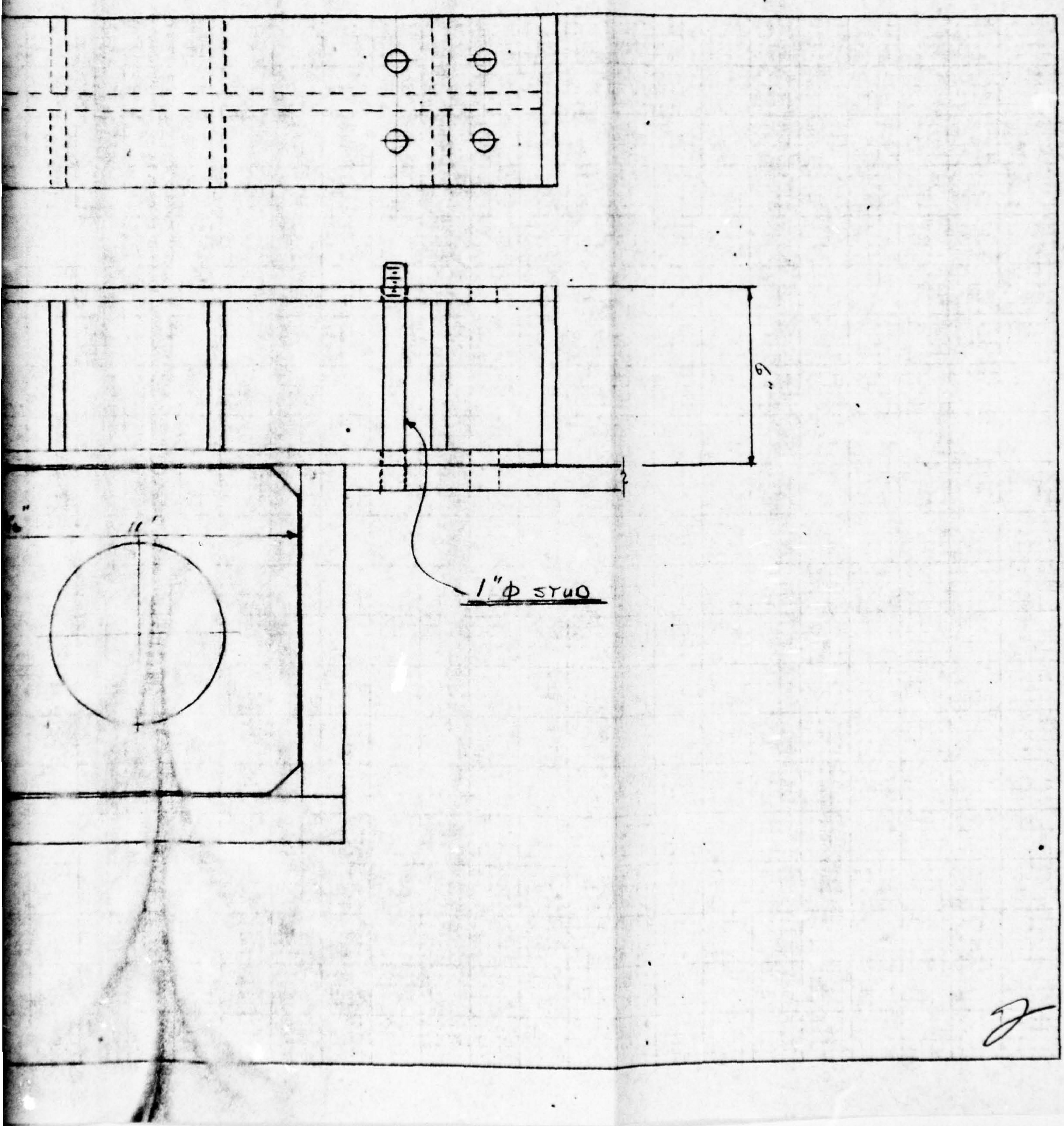
COMPANY	SHEET NO.
US ARMY / EROL	2
SUBJECT	
MONO-MOORING SYSTEM	

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		5/28/65





PENDANT CONNECTION



ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY: U.S. ARMY/ERDL

SHEET NO: 3

SUBJECT: MONO-MOORING SYSTEM

NUMBER: JOB 56017 | COMPUTER: ANDREWS | CHECKED BY: | DATE: 5/28/65

CHECK 6" BM COVER

$$I = \frac{bd^3}{12} = \frac{6(6)^3}{12} = 108$$

$$= \frac{5.5(5)^3}{12} = 37.2$$

$$70.8 \text{ IN.}^4$$

$$S = \frac{70.8}{3} = 23.6 \text{ IN}^3$$

$$f = \frac{78.1}{23.6} = 3.3 \text{ ksi}$$

6" BM O.K.

CHECK SHEAR IN 1"φ BOLTS

MAX. $P \approx \frac{120}{2} = 60^k$

ALLOWABLE SINGLE SHEAR 1"φ BOLT = 15.71^k

ALLOW $P = 15.71(4) = 63^k > 60^k$ O.K.

USE 1"φ A 357 Gr Bc

PE

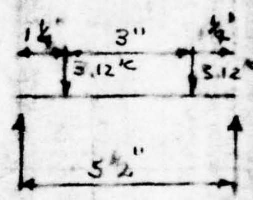
CHECK BEARING O

$H = 60^k$

ALLOWABLE H = 33.75(

1"φ BOLT O.K. IN

CHECK BENDING



$S = \frac{bd^2}{6} = \frac{3(.75)^2}{6}$

$f = \frac{3.9}{.28} = 12$ ksi

3

PENDANT CONNECTION

/28/65

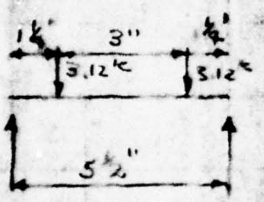
CHECK BEARING ON 1" ϕ BOLTS

$H = \underline{60^k}$

ALLOWABLE $H = 33.75(4) = \underline{\underline{135^k}}$

1" ϕ BOLT O.K. IN BEARING

CHECK BENDING IN $\frac{3}{4}$" PL



$M = (1.25) = \underline{3.9''^k}$

CONSIDER 3" WIDE SECTION

$S = \frac{bd^2}{6} = \frac{3(.75)^2}{6} = \underline{0.28}$

$f = \frac{3.9}{.28} = \underline{12\,ksi \quad O.K.}$

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

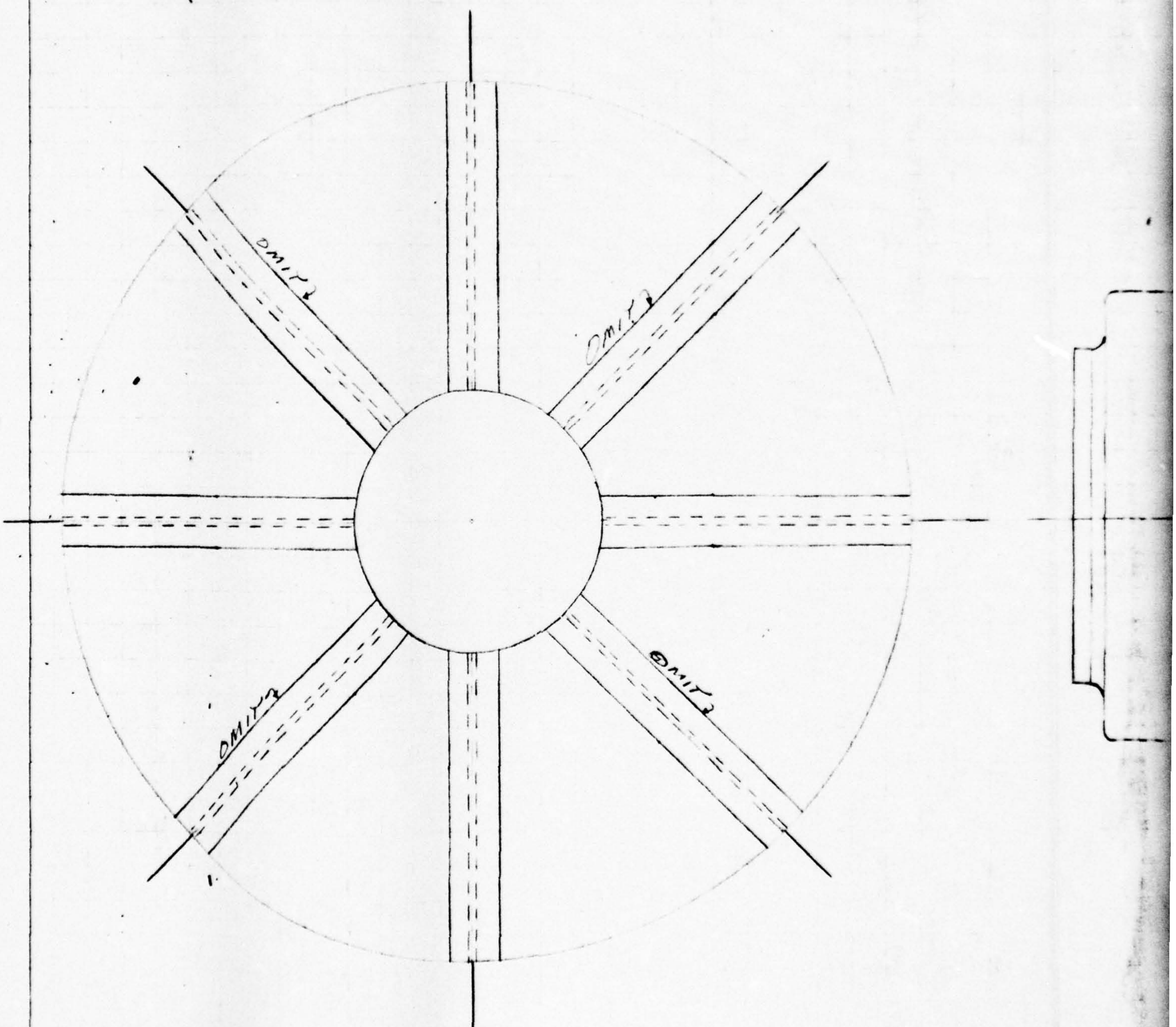
J. RAY McDERMOTT & CO., INC.

COMPANY U. S. ARMY / ERDL	SHEET NO 1

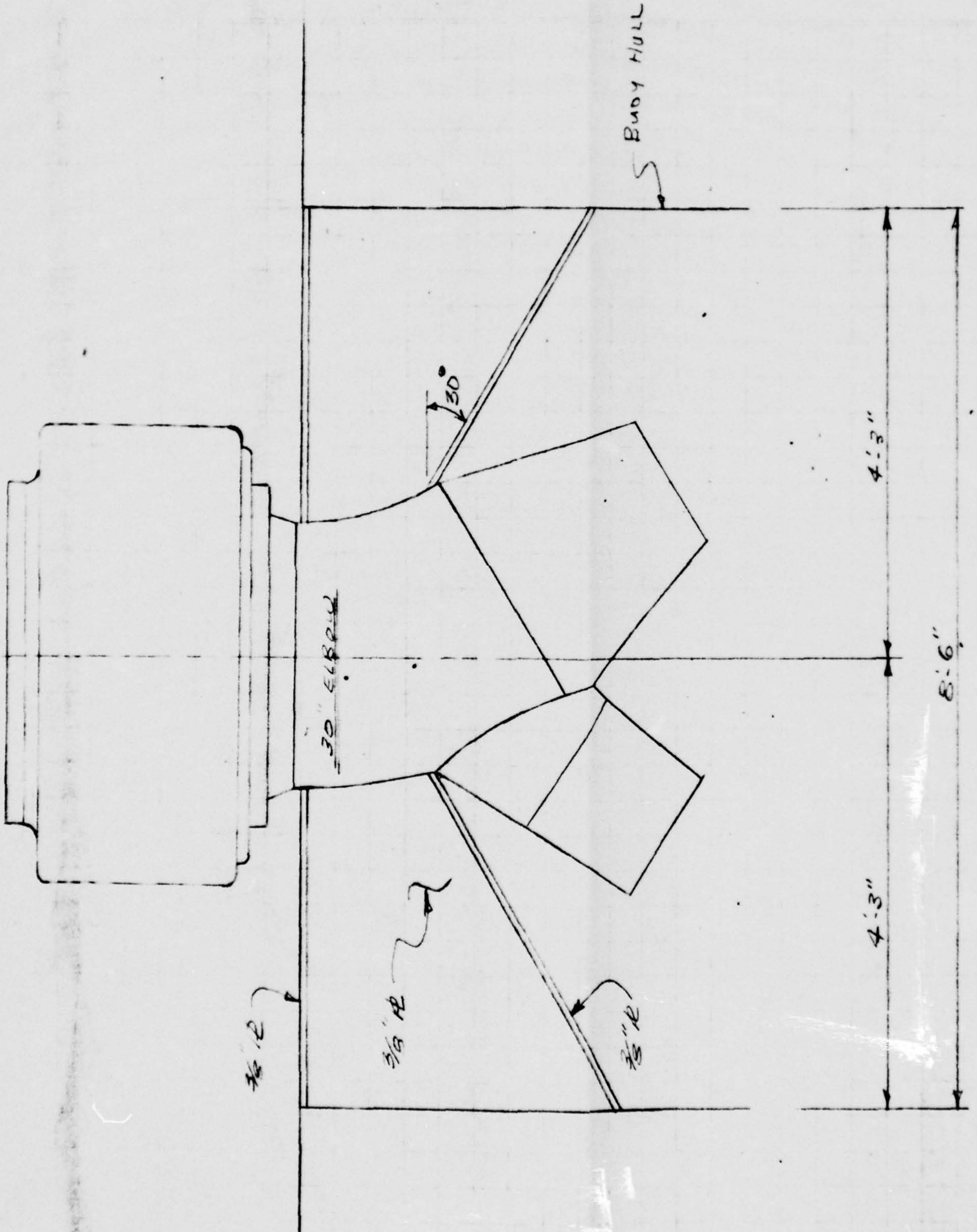
SUBJECT MONO-MOORING SYSTEM

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017.	ANDREWS		4/27/65

DESIGN OF SWIVEL TO BUOY CONN.



SWIVEL TO BUOY CONNECTION



3

2K30 26" 6,000 (14,000#)

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U. S. ARMY/ERDL	2

SUBJECT: MONO-MOORING SYSTEM

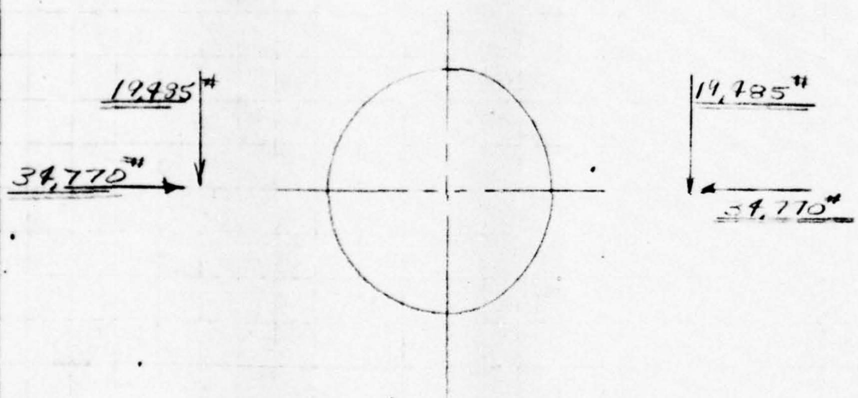
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		4/28/65

LOADS ACTING ON SWIVEL

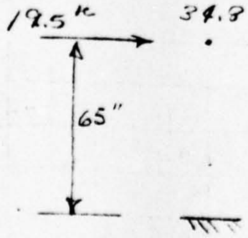
WEIGHT ≈ 18,000#

UPWARD PUMPING LOAD = 96K

UPWARD PUMPING LOAD WITH ONE LINE FLOWING = 62K



CONSIDER UNBALANCED CONDITION WITH SWIVEL FROZEN OR LOCKED



$M_{xx} = 19.5(65) = 1270$ "K

$M_{yy} = 34.8(65) = 2260$ "K

$\sqrt{(1270)^2 + (2260)^2} = 2590$

TORQUE = 19.5(53) = 1030 "K

$f = \frac{2590}{255.29} = 10.2$ ksi $S_s = \frac{1030}{255.29(2)} = 2.02$ ksi

30" ϕ O.K.

SWI...

CONSIDER WEL...
30" ϕ ELBOW...

UPLIFT = 62K

T = C = 2,590/30...

$F/_{11} = \frac{62}{8(16)} = .47$...

$F/_{11} = \frac{86.7}{4(15)} = 1.35$...

$F/_{11}$ TOTAL = 1.82...

TRY ¼" WELD...

$F/_{11}$ ALLOWABLE = ...

USE FOUR STIF...

CHECK WELD O... MECHANISM (SEE... DATED 4/29/65)

MAX. F ≈ 20K

$F/_{1} = \frac{20}{12} = 1.67$...

S_s 3/8" PL = ...

3/8" PL & ¼" F... 50 KE...

oo #)

SWIVEL TO BUOY CONN. & DECK LOCKING MECHANISM

8/65

CONSIDER WELD OF STIFFENERS TO 30" ϕ ELBOW.

UPLIFT = 62^k   MOM. = 2,590''^k

T = C = 2,590/30 = 86.4^k

$F/_{''} = \frac{62}{3(16)} = .47\ ^k/_{''}$

$F/_{''} = \frac{86.4}{4(16)} = 1.35\ ^k/_{''}$

$F/_{''}$ TOTAL = 1.84 $^k/_{''}$

TRY 1/4" WELD

$F/_{''}$ ALLOWABLE = .707(.25)(13.6) = 2.4 $^k/_{''}$

USE FOUR STIFFENERS

CHECK WELD ON DECK LOCKING MECHANISM (SEE PG. 1 OF 2 BY PETRIE DATED 4/29/65)

MAX F = 20^k   LENGTH OF WELD = 12"

$F/_{''} = \frac{20}{12} = 1.67\ ^k/_{''}$ 1/4" WELD O.K.

S_s 3/8" PL = $\frac{20}{6(.375)}$ = 8.9 ksi < 13.6 ksi O.K.

3/8" PL & 1/4" FILLET WELDS O.K. FOR SOCKET.

J

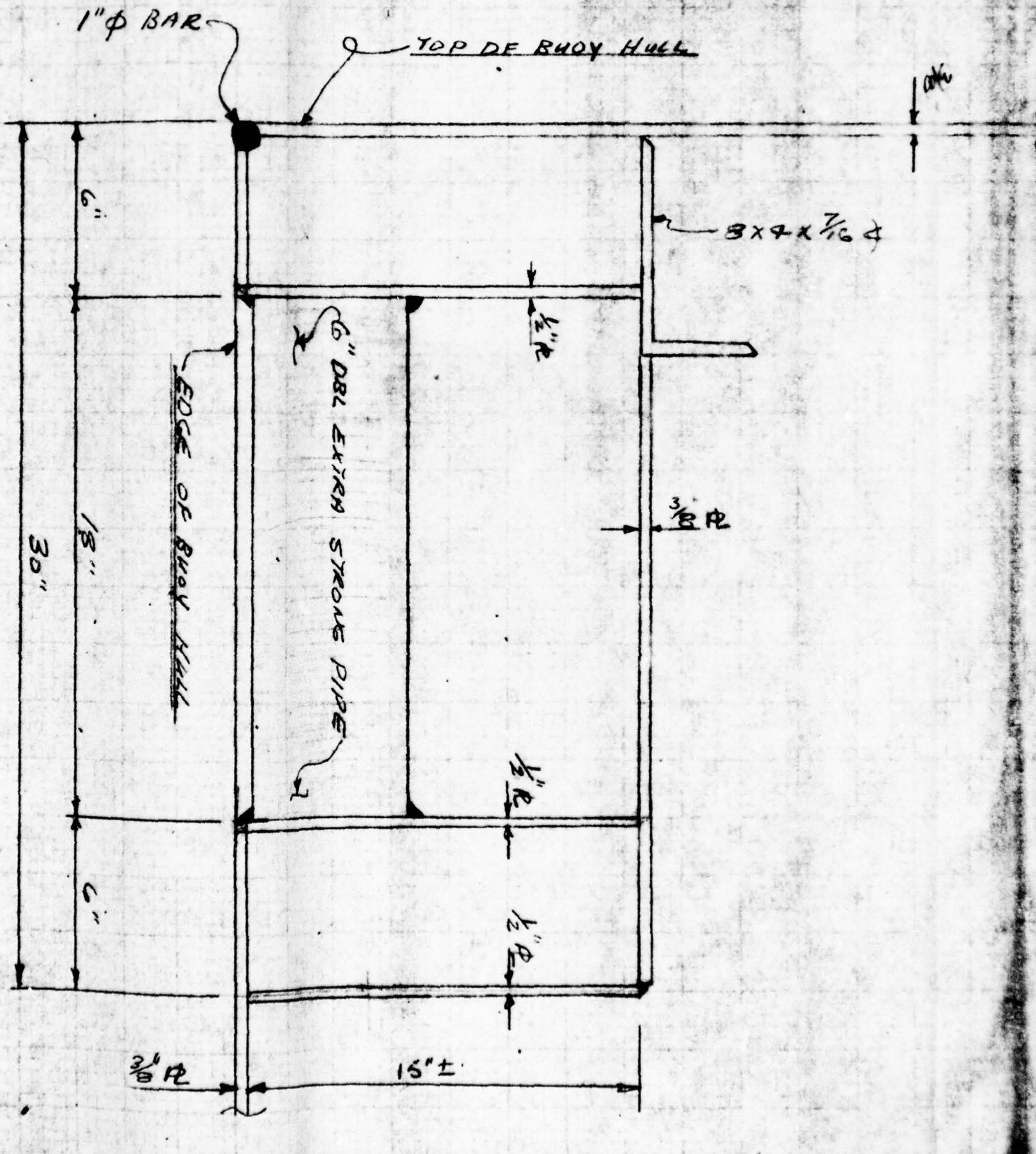
ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 5036

J. RAY McDERMOTT & CO., INC.

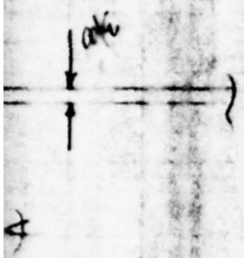
COMPANY	SHEET NO.
U. S. ARMY / ECOL	2

SUBJECT: MONO-MOORING SYSTEM

DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		6/1/65



TEMPORARY RECESSED MOORING BIT



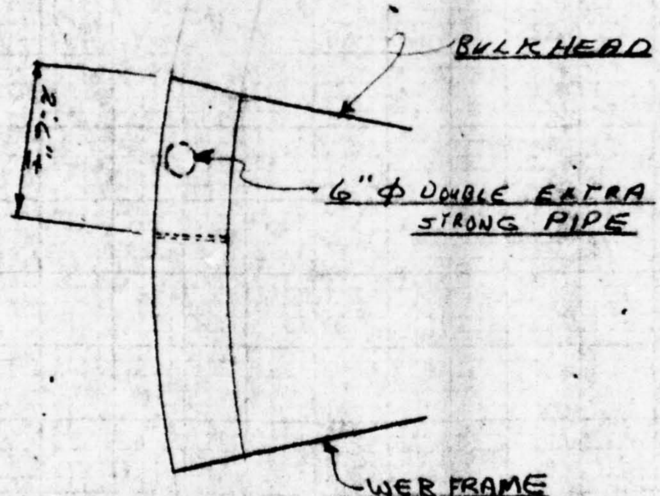
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

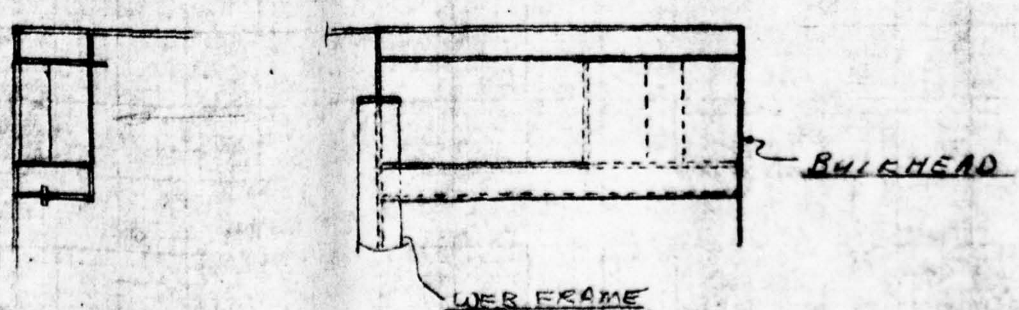
J. RAY McDERMOTT & CO., INC.

COMPANY: U. S. ARMY/ERDL	SHEET NO: 1
SUBJECT: MONO - MOORING SYSTEM	
NUMBER: JOB 56017	COMPUTER: ANDREWS / CHECKED BY: / DATE: 6/1/65

DESIGN OF TEMPORARY BIT

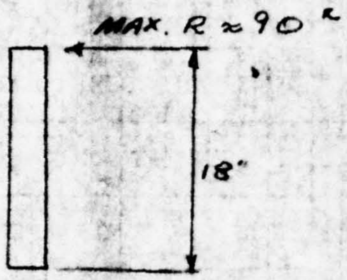
DESIGN BIT FOR LOAD OF 100^{K}





TEMPORARY RECESSED MOORING BIT

CHECK 6" DBL. EXTRA STRG. PIPE



$$MAX.\ MOM. = \frac{PL}{4} = \frac{100(18)}{4} = \underline{450''^{K}}$$

$$f = \frac{Mc}{I} = \frac{450(3.12)}{66.33} = \underline{21.2\ ksi}\quad \underline{O.K.}$$

CHECK WELD

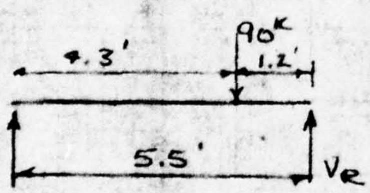
$$L = 3.14(6.25) = 19.5''$$

$$K/_{''} = \frac{90}{19.5} = \underline{4.6^{K}/_{''}}$$

TRY $\frac{1}{2}$" FILLET WELD

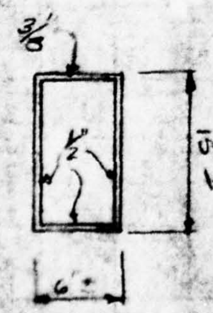
$$ALLOW\ K/_{''} = .5(.707)(13.5) = 4.77^{K}/_{''} > 4.60^{K}/_{''}\ O.K.$$

CHECK BENDING & SHEAR ON ℄ GIRDER BETWEEN BULKHEAD AND WEB FRAME



$$V_R = 90\left(\frac{4.3}{5.5}\right) = \underline{70.5^{K}}$$

$$M = 70.5(1.2)(12) = \underline{1030''^{K}}$$



$$I = \frac{bd^3}{12} = \frac{6(15)^3}{12} = 1700\ IN.^4$$

$$\frac{bd^3}{12} = \frac{5(14.125)^3}{12} = 1185$$

$$I = \underline{515\ IN.^4}$$

$$S = \frac{515}{7.5} = \underline{68.6\ IN.^3}$$

$$f = \frac{1030}{68.6} = \underline{15\ ksi\ O.K.}$$

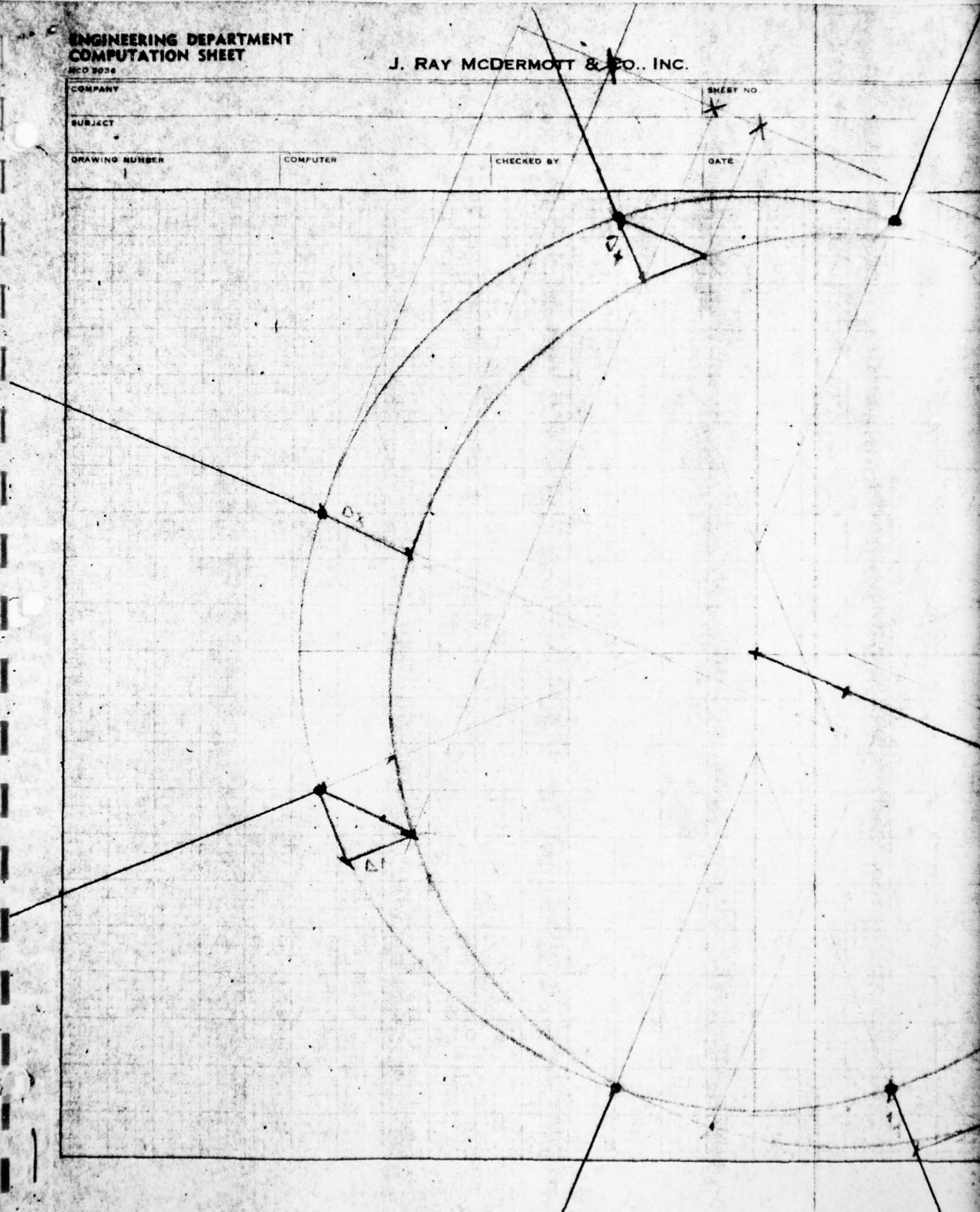
$$ALLOW\ V = .5(15)(2)(13.5) = \underline{202^{K} > 70.5\ O.K.}$$

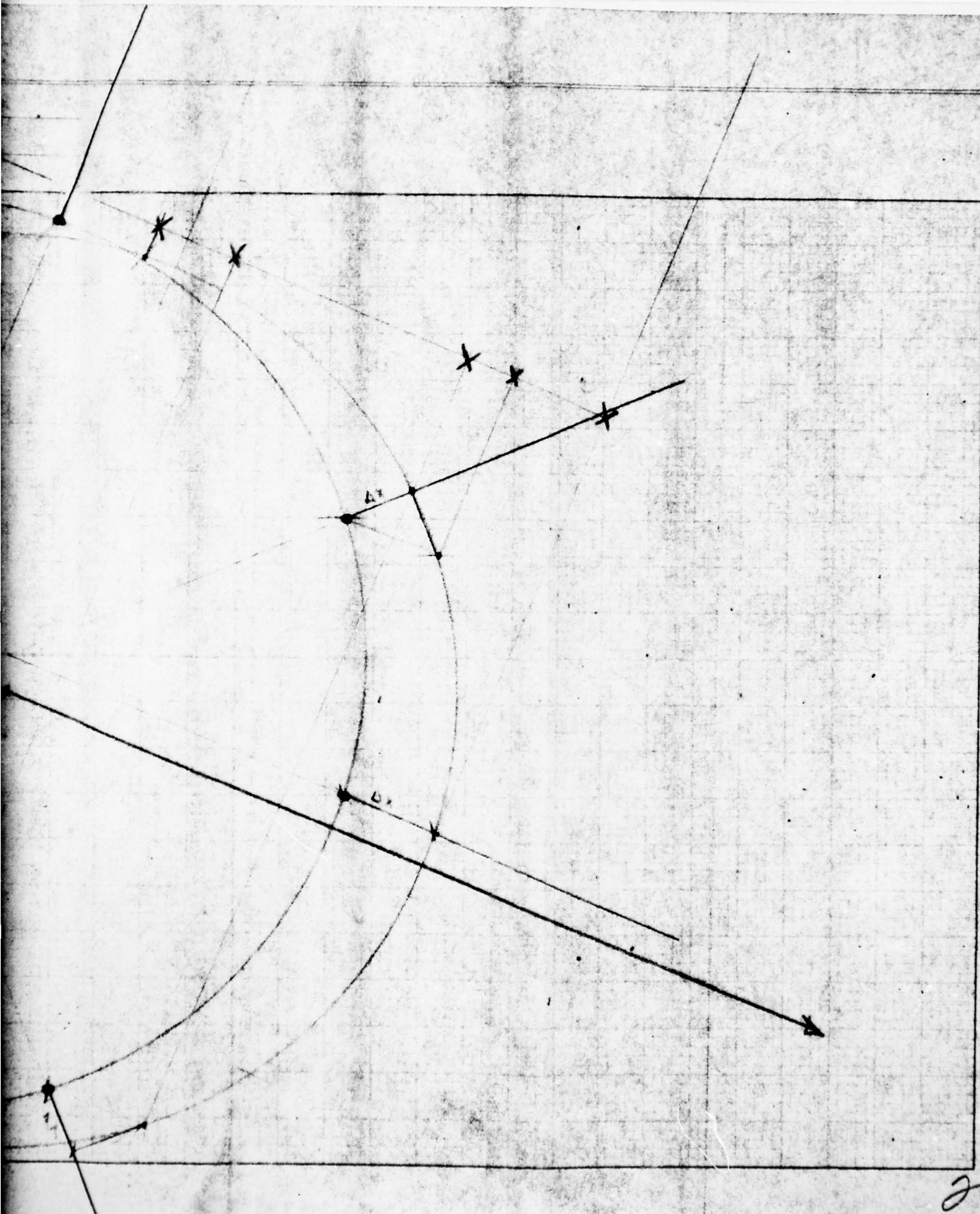
MISC. SKETCHES

ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCO 3036

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
SUBJECT			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE





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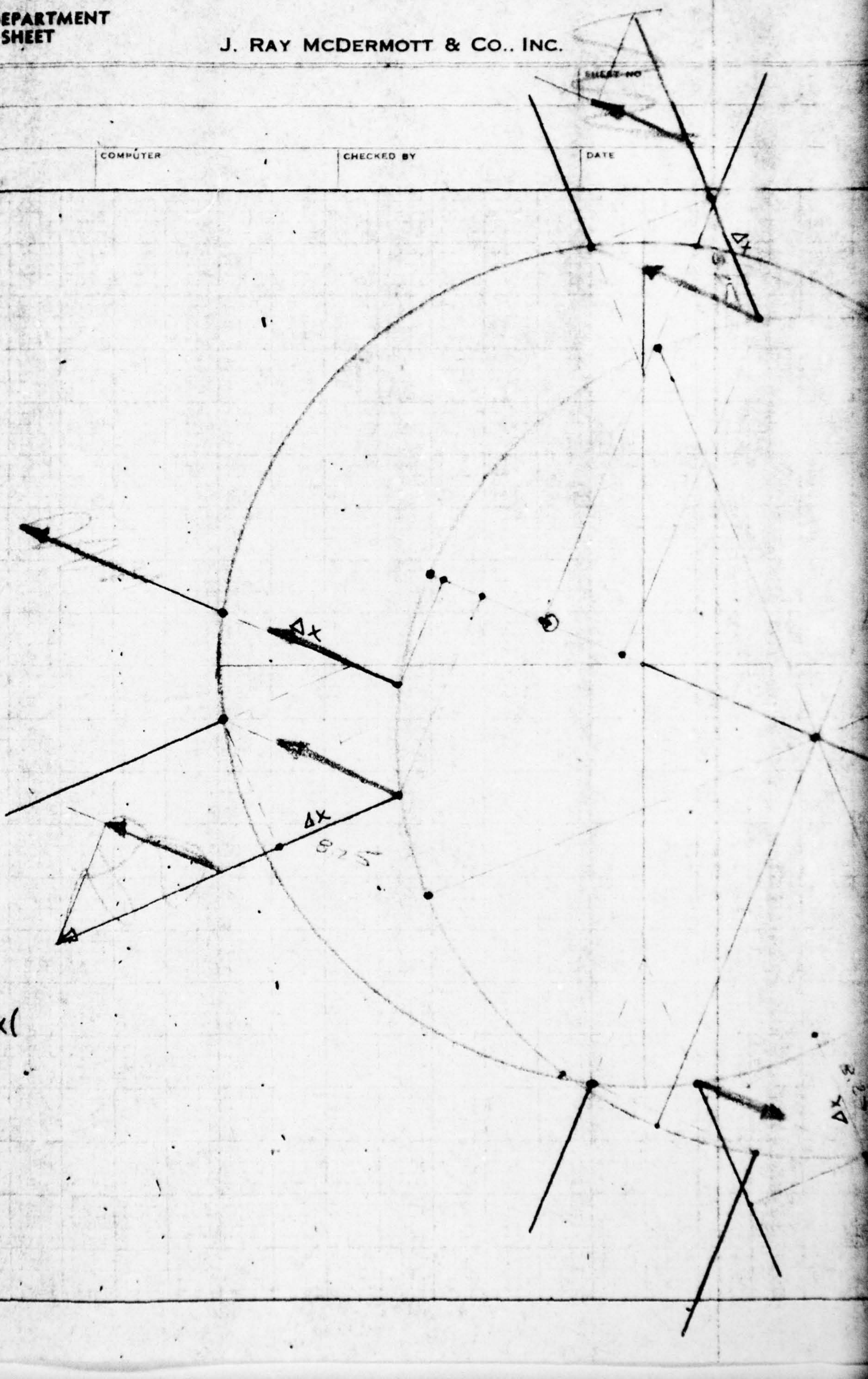
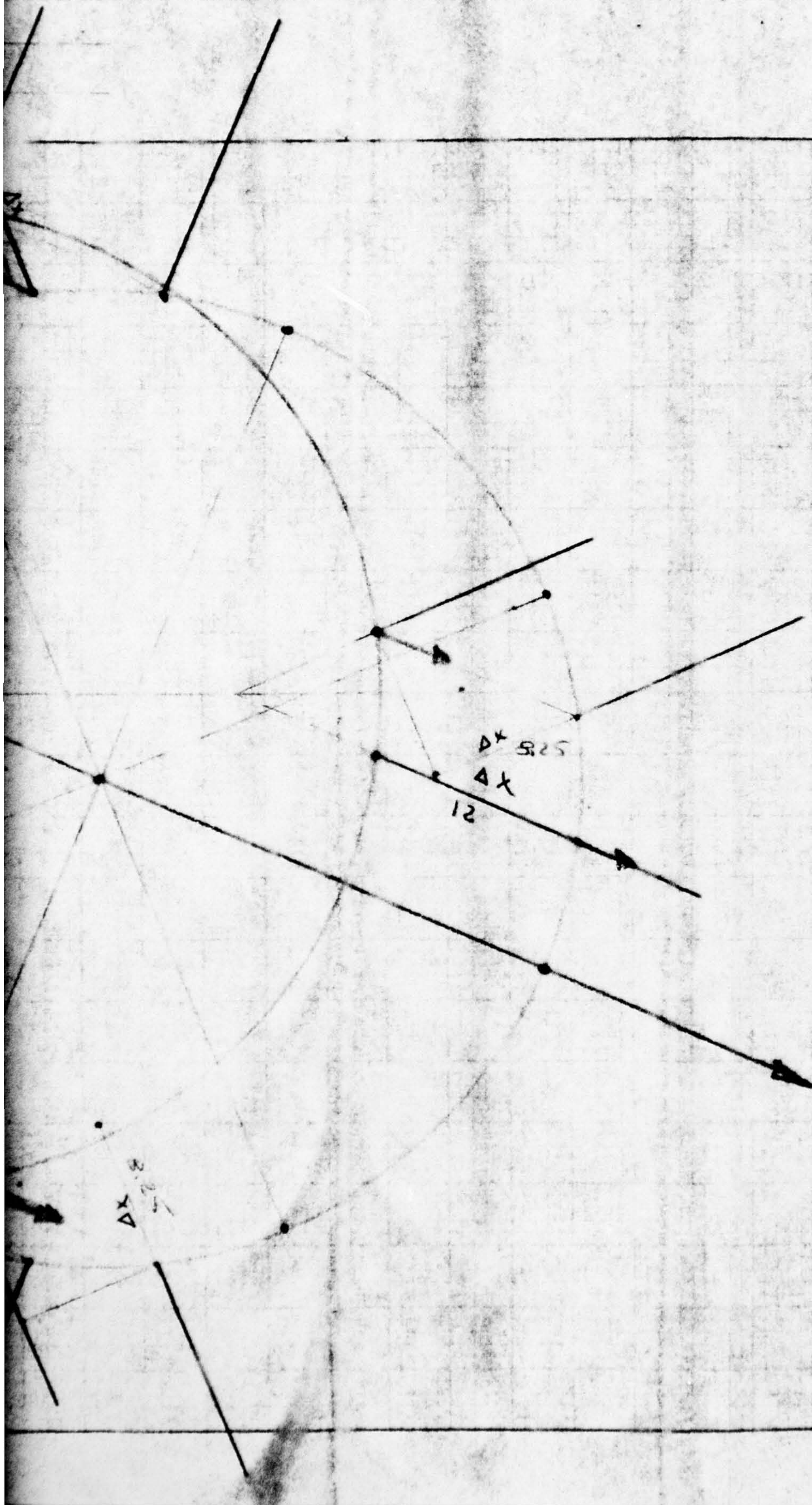
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 5036

J. RAY McDERMOTT & CO., INC.

COMPANY			SHEET NO
SUBJECT			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE



$x(13.33) + x($



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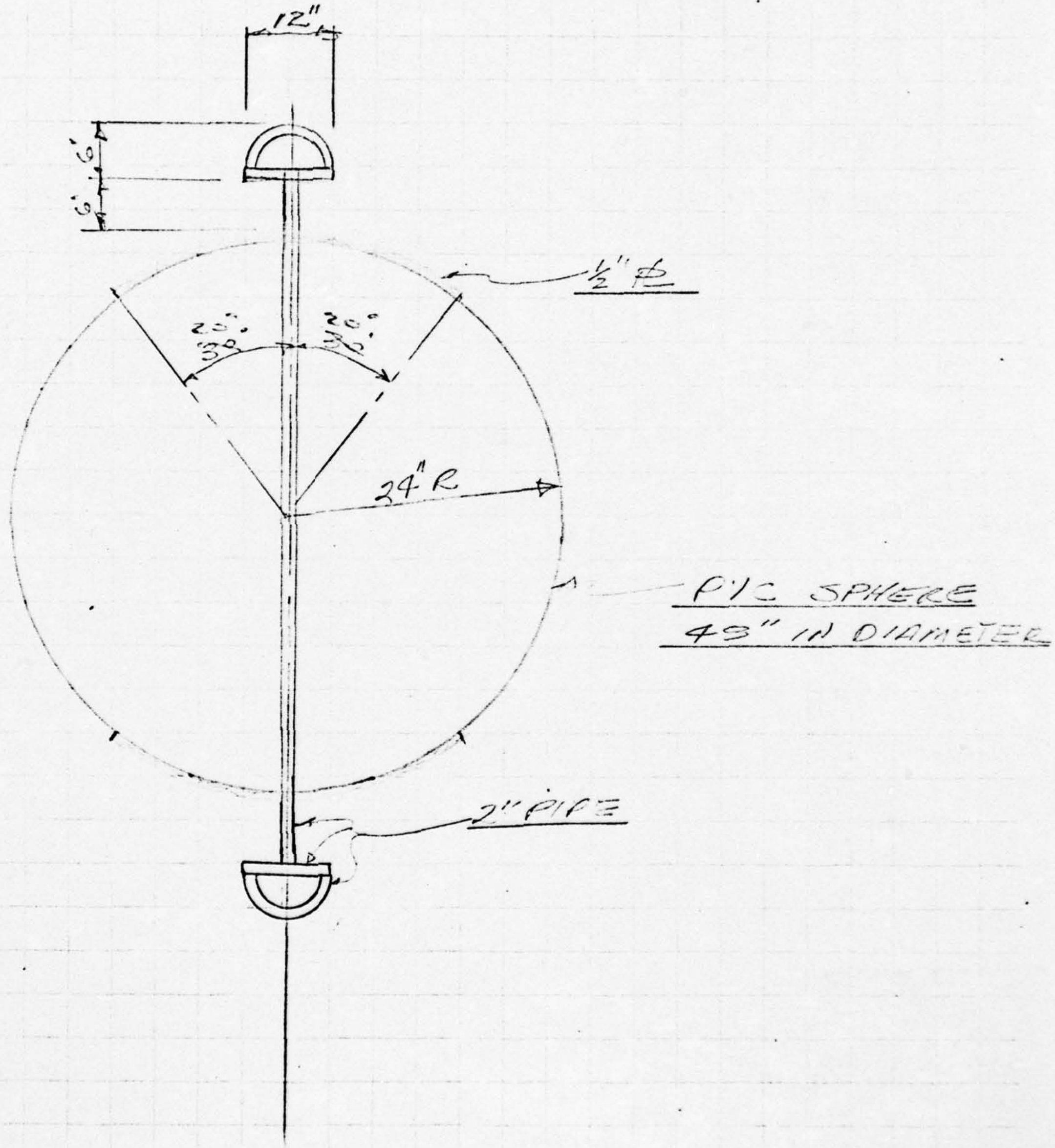
SECTION III

MOORING

COMPUTATION SHEET
ENGINEERING DEPARTMENT
MCD 5011

J. RAY McDERMOTT & CO., INC.

COMPANY	FIELD	SHEET NO.
SUBJECT	WELL NO.	DATE
DRAWING NO.	COMPUTER	



ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U.S. ARMY / ERDL	1

SUBJECT			
MONO-MOORING SYSTEM			
DRAWING NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		5/10/65

SIZE CHAIN ENDS FOR S.F. 2.0 FOR PROOF LOAD OF CHAIN.

PROOF LOAD REQUIRED $\approx \frac{300(.65)(2)}{.866} = 450^K = 225^T$

USE SIZE $3\frac{1}{2}$ ROUND-PIN CHAIN SHACKLE

BREAKING LOAD $\approx$ ___ ^{T}

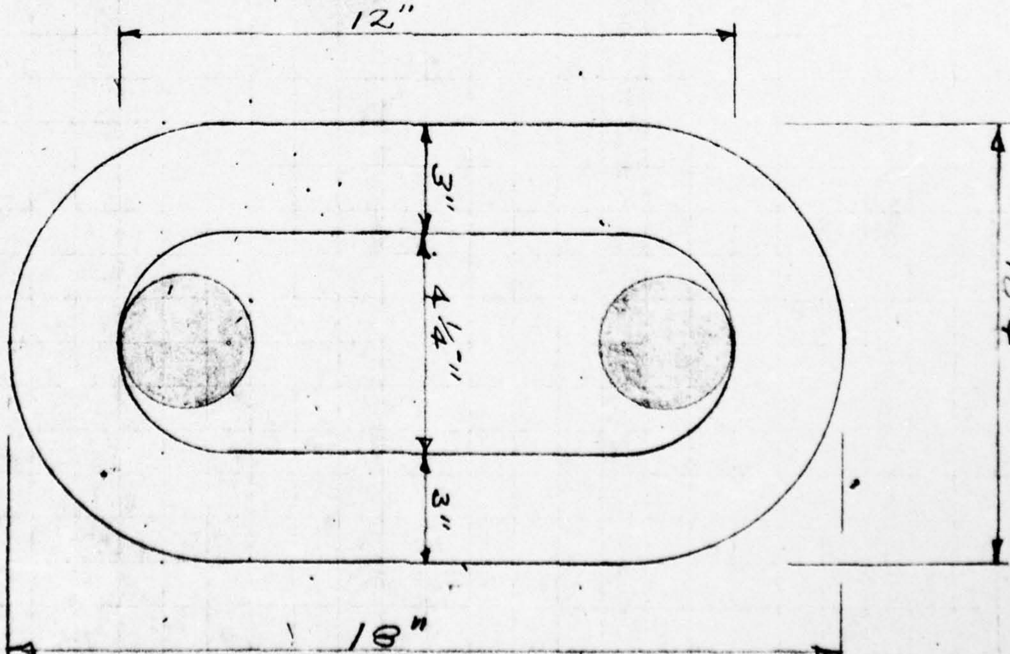
DESIGN OF ENDLESS CONNECTING LINK

USE A ALLOWABLE PROOF LOAD STRESS = 35 ksi

$A_{REQ'D} = \frac{450}{2(35)} = 6.44\ \square''$ $\quad D^2 = \frac{6.44}{.785} = 8.20$

$D = 2.86''$

TRY 3" ϕ LINK



MOORING LINES

DESIGN OF PAD EYE (USE 65% UNBALANCED & ALLOWABLE STRESSES)

MAX H LOAD $\approx 300(.65) = \underline{\underline{195^k}}$ RESULTANT @ 30° $= \frac{195}{.866} = \underline{\underline{225^k}}$

PIN DIA. FOR NO. 3 ROUND PIN SHACKLE = 3"

SPREAD OF SHACKLE = $4\frac{3}{4}$" TRY $2\frac{1}{2}$" PL WITH 1" CHEEK PLS.

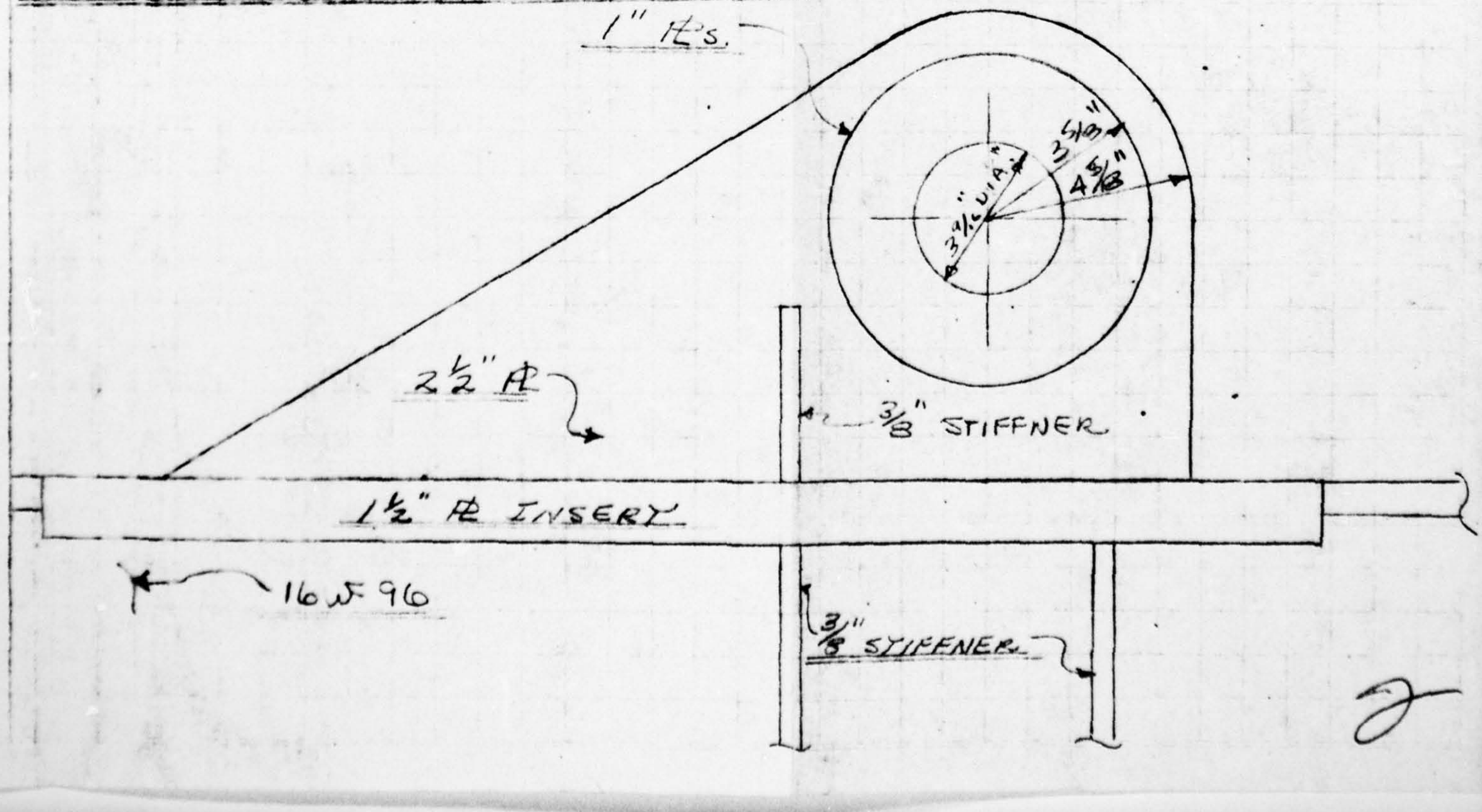
ALLOWABLE BEARING ON 3" PIN $= 96(4.5) = 431^k > 225^k$ O.K.

ALLOWABLE SHEAR 15,000 psi P = 212.1 < 225 NO GOOD

ALLOWABLE SHEAR = 20,000 psi $P = 283^k > 225$ O.K.

~~FABRICATE PIN OF 60,000 psi YIELD STEEL~~

~~CHANGE TO $3\frac{1}{2}$" D. PIN FOR #$3\frac{1}{2}$ SHACKLE~~



$10\frac{1}{2}$"

ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

J. RAY McDERMOTT & CO., INC.

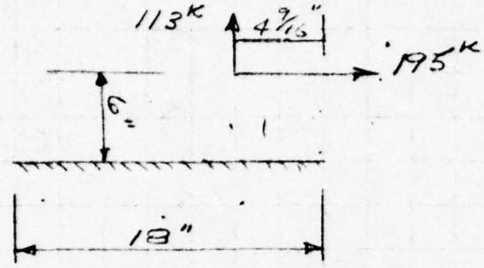
COMPANY: U.S. ARMY / ERDL — SHEET NO: 2

SUBJECT: MONO-MOORING SYSTEM

DRAWING NUMBER: JOB 56017 — COMPUTER: ANDREWS — CHECKED BY: — DATE: 5/11/65

CHECK WELD OF PAD EYE TO 16 WF

1170
501
669



4 9/16
4 9/16

TOTAL $L = \underline{36''}$ $\quad S = \frac{bd^2}{6} = \frac{(1)(18)^2}{6}(2) = \underline{108\ IN.^3}$

9
7 9/16
4 7/16

$M = 195(6) - 113(4.44) = 1170 - 501 = \underline{669''^K}$

$F/_{11} = \frac{669}{108} = \underline{6.2\ ^K/_{11}}$ $\quad F/_{11} = \frac{225}{36} = \underline{6.25\ ^K/_{11}}$

TOTAL $F/_{11} = 6.2 + 6.25 = \underline{12.45\ ^K/_{11}}$

TRY 1/2" FILLET WELD

ALLOWABLE $F/_{11} = .5(.707)(14.5) = 5.12\ ^K/_{11} > 12.45$ NO GOOD

24
4 9/16
7 7/16
12
7 7/16

INCREASE LENGTH OF WELD TO 24" EACH SIDE

TOTAL $L = \underline{48''}$ $\quad S = \frac{1(24)^2}{6}(2) = \underline{192\ IN.^3}$

$M = 195(6) - 113(7.44) = 1170 - 840 = \underline{330''^K}$

1170
840
330.

$F/_{11} = \frac{330}{192} = \underline{1.72\ ^K/_{11}}$ $\quad F/_{11} = \frac{225}{48} = \underline{4.7\ ^K/_{11}}$

1.72
4.7
6.42

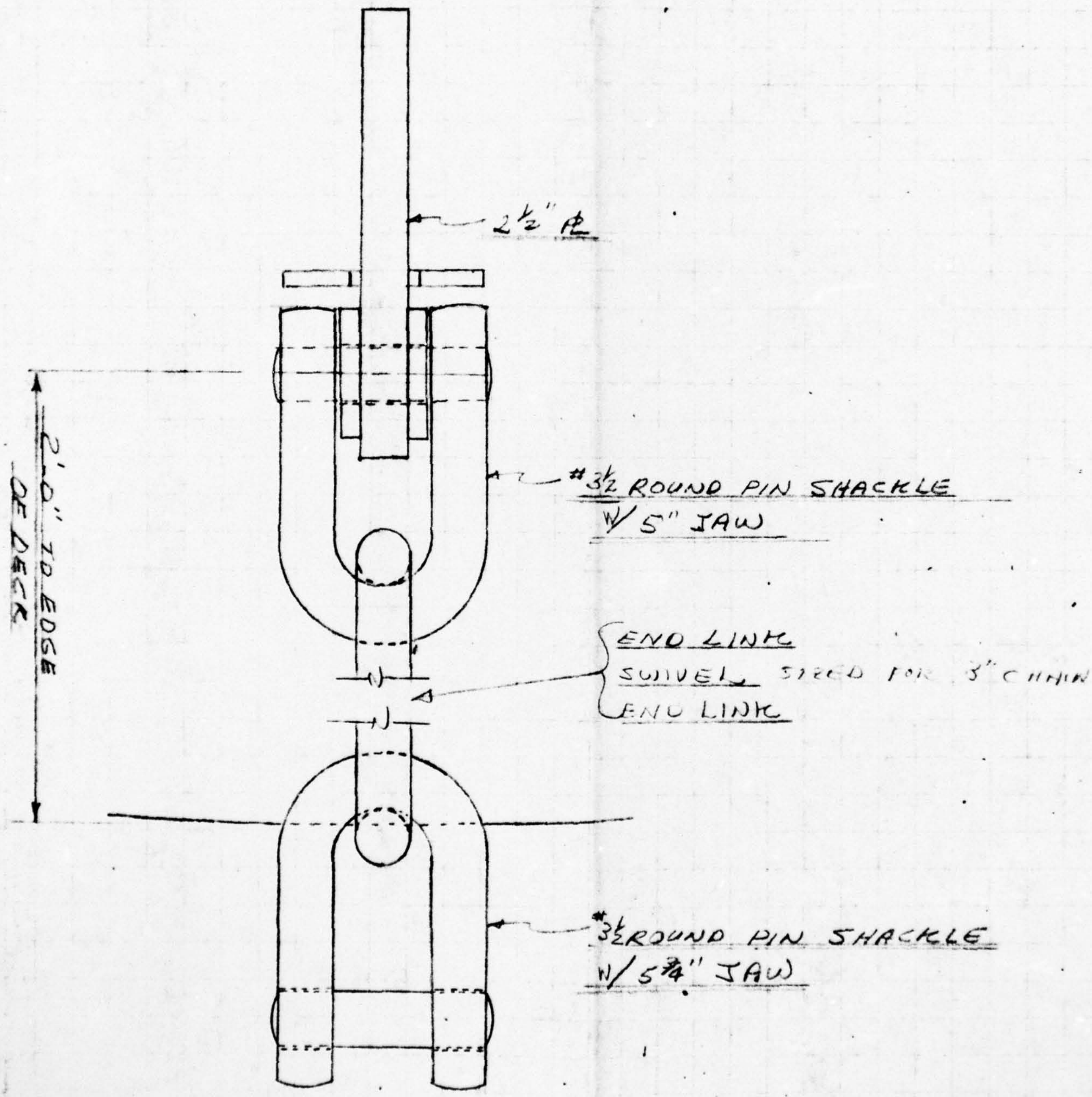
TOTAL $F/_{11} = \underline{6.42\ ^K/_{11}}$

TRY 3/4" FILLET WELD

ALLOWABLE $F/_{11} = .75(.707)(14.5) = \underline{7.7\ ^K/_{11} > 6.42\ ^K/_{11}}$ $\underline{O.K.}$

USE 3/4" FILLET WELD.

MOORING DESIGN



ENGINEERING DEPARTMENT
COMPUTATION SHEET
MCD 14003

J. RAY McDERMOTT & CO., INC.

COMPANY	SHEET NO
U. S. ARMY / ERDL	3
SUBJECT: MONO-MOORING SYSTEM	

NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		5/11/65

DESIGN OF NYLON ROPE MOORING LINES

ASSUME 65% UNBALANCED & F.S. 1.25

PREQD: $\approx 300(.65)(1.25) = \underline{244}^{K}$

USE 12" CIR. NYLON ROPE BREAKING STRENGTH $\approx \underline{360}^{K}$

DESIGN OF WIRE ROPE CONNECTING TO SHIP'S BOLLARDS.

SIZE FOR S.F. 2.0 $P = 300(.65)(2) = \underline{390}^{K} = \underline{195}^{T}$

USE 2"ϕ 6x37 CLASSIFICATION WIRE ROPE IWRC EXTRA IMPROVED PLOW STEEL.
USE 150' OF WIRE ROPE TO ALLOW ADJUSTMENT TO PROPER LENGTH.

SIZE OF WIRE ROPE FOR CARRYING OUT TO SHIP.

USE 1⅛"ϕ 6x37 CLASSIFICATION WIRE ROPE IWRC, EXTRA IMPROVED PLOW STEEL.
USE 350' LONG LINE

BREAKING STRENGTH = 123.8^{K}

$$\begin{array}{r} 61.9 \\ 2 \\ \hline 123.8 \end{array}$$

NO 3

MOORING DESIGN

/11/65

NT

2

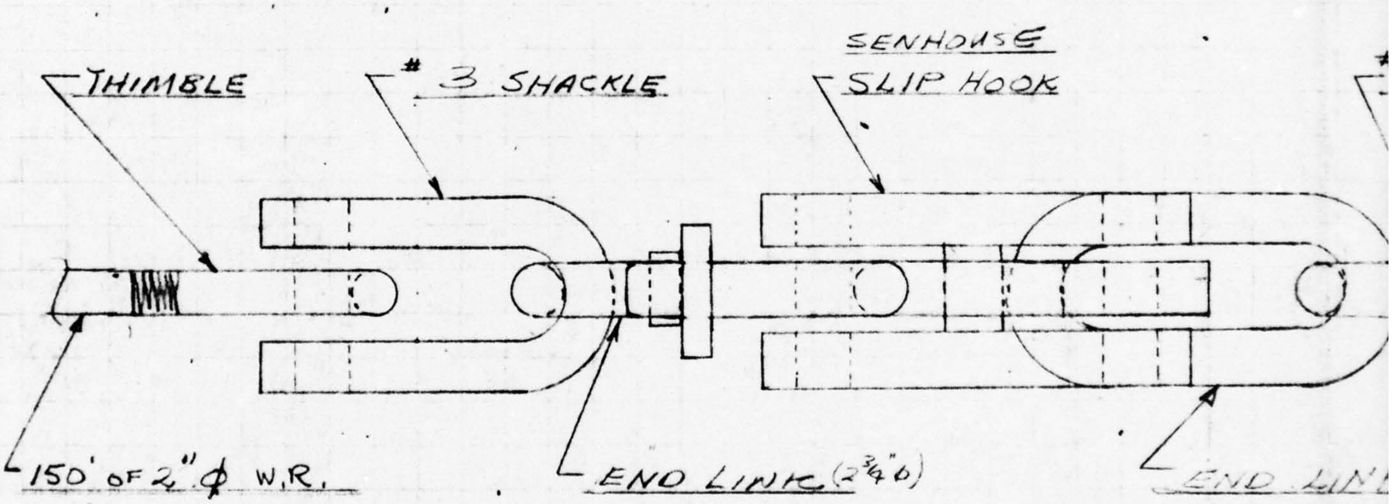
ENGINEERING DEPARTMENT
COMPUTATION SHEET
McD 14003

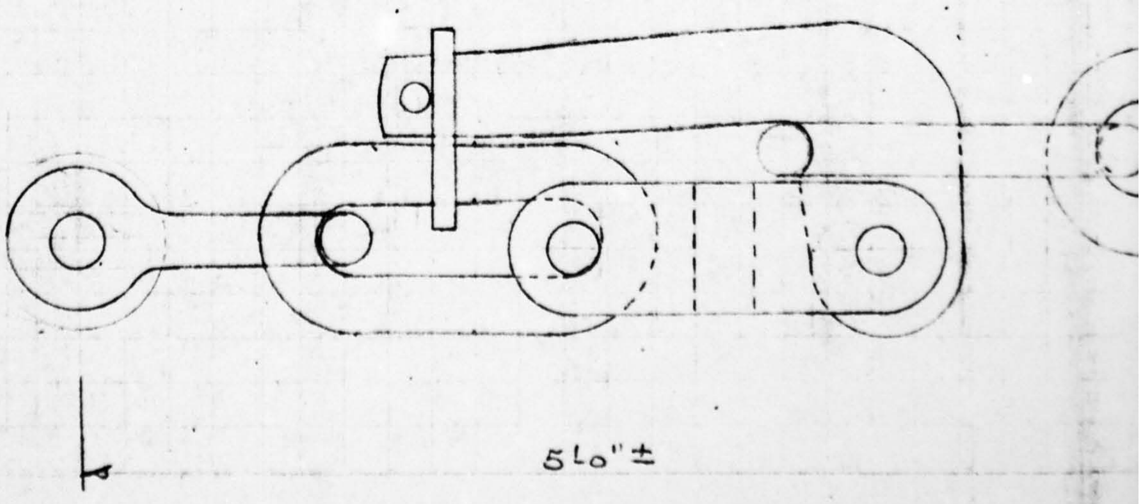
J. RAY McDERMOTT & CO., INC.

2½

COMPANY			SHEET NO
U.S. ARMY / ERDL			4
SUBJECT: MONO-MOORING SYSTEM			
~~DRAWING~~ NUMBER	COMPUTER	CHECKED BY	DATE
JOB 56017	ANDREWS		5/14/65

NOTE: MIN. PROOF CAPACITY OF THIMBLE, SHACKLES, OPEN LINK AND SLIP HOOK TO BE





AD-A034 242 MCDERMOTT (J RAY) CO INC NEW ORLEANS LA F/G 13/10
ENGINEERING DESIGN CALCULATIONS MONO-MOORING SYSTEM. VOLUME 1. --ETC(U)
1966 DA-44-009-AMC-841(T)
UNCLASSIFIED NL

4 OF 4
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END
DATE
FILMED
2 - 77

OF 4

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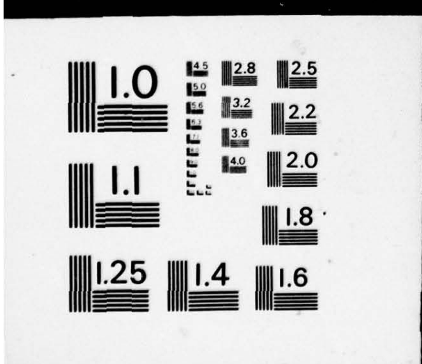

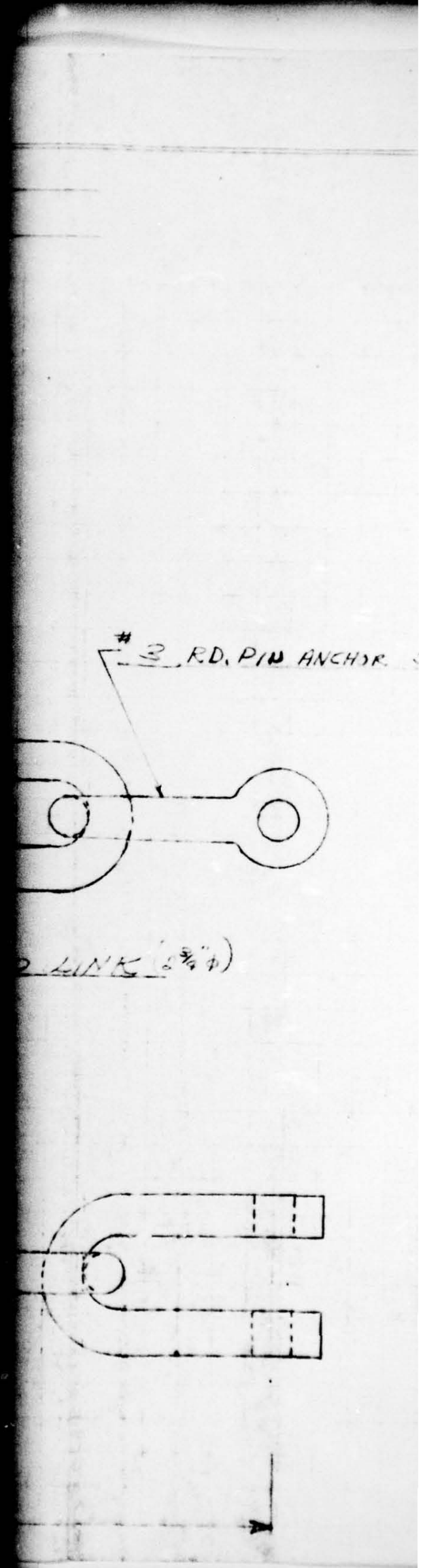

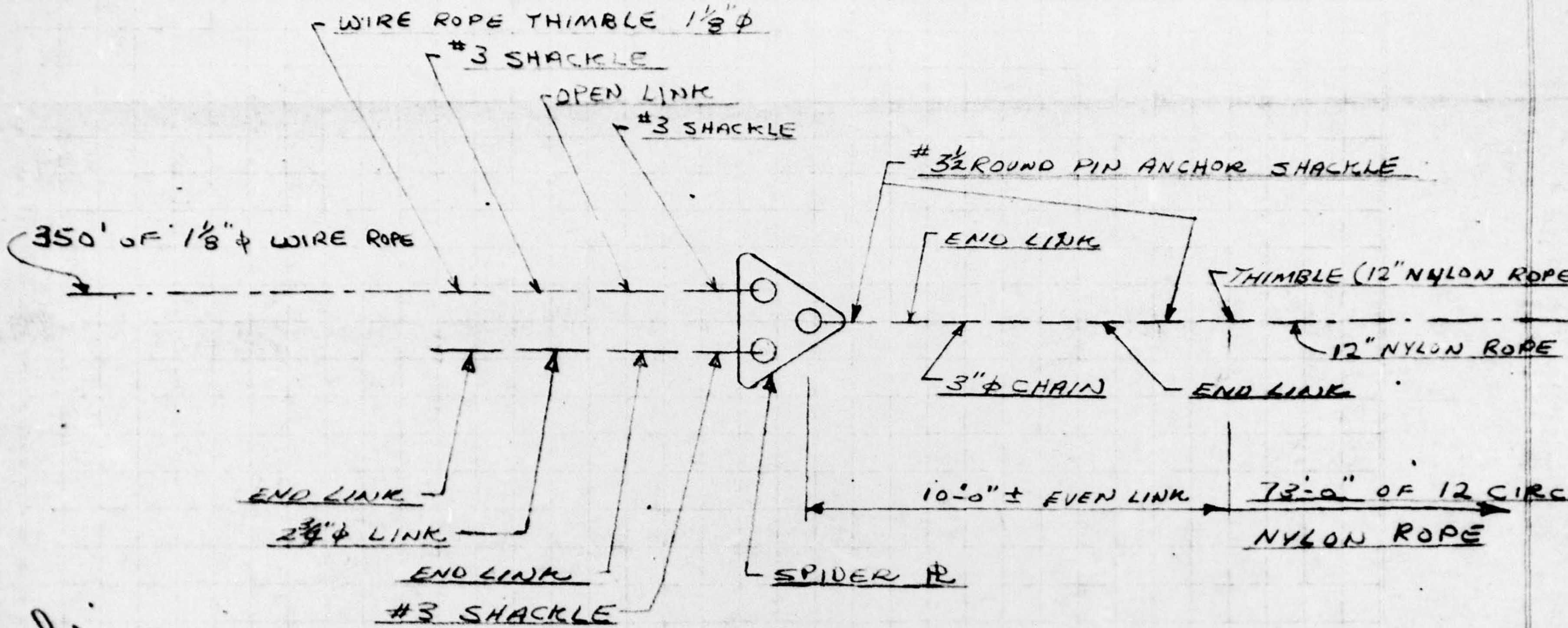

WIRE ROPE THIMBLE 1⅛"φ
#3 SHACKLE
OPEN LINK
#3 SHACKLE
#3½ ROUND PIN ANCHOR SHACKLE
350' OF 1⅛"φ WIRE ROPE
END LINK
THIMBLE (12" NYLON ROPE)
12" NYLON ROPE
3"φ CHAIN
END LINK
END LINK
2¾"φ LINK
END LINK
#3 SHACKLE
SPIDER PL
10'-0" ± EVEN LINK
73'-0" OF 12 CIRC.
NYLON ROPE

2

J. RAY McDERMOTT & CO., INC.

ENGINEERING DEPARTMENT - COMPUTATION SHEET SHEET NO.______

...v. U.S. ARMY / ERDL

... MONO-MOORING SYSTEM

...s No. 56017 COMPUTER ANDREWS CHKD. BY ______ DATE 8/25 1965

DESIGN OF SISTER PLATE

MAX. $F = \underline{400^{k}}$ USE A-36 STEEL

$A_{req'd} = \frac{400}{20} = \underline{20\ \square''}$